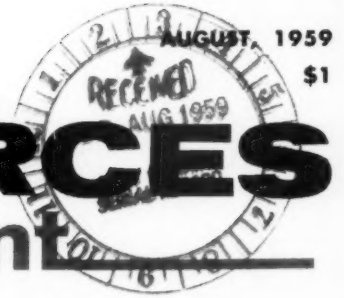
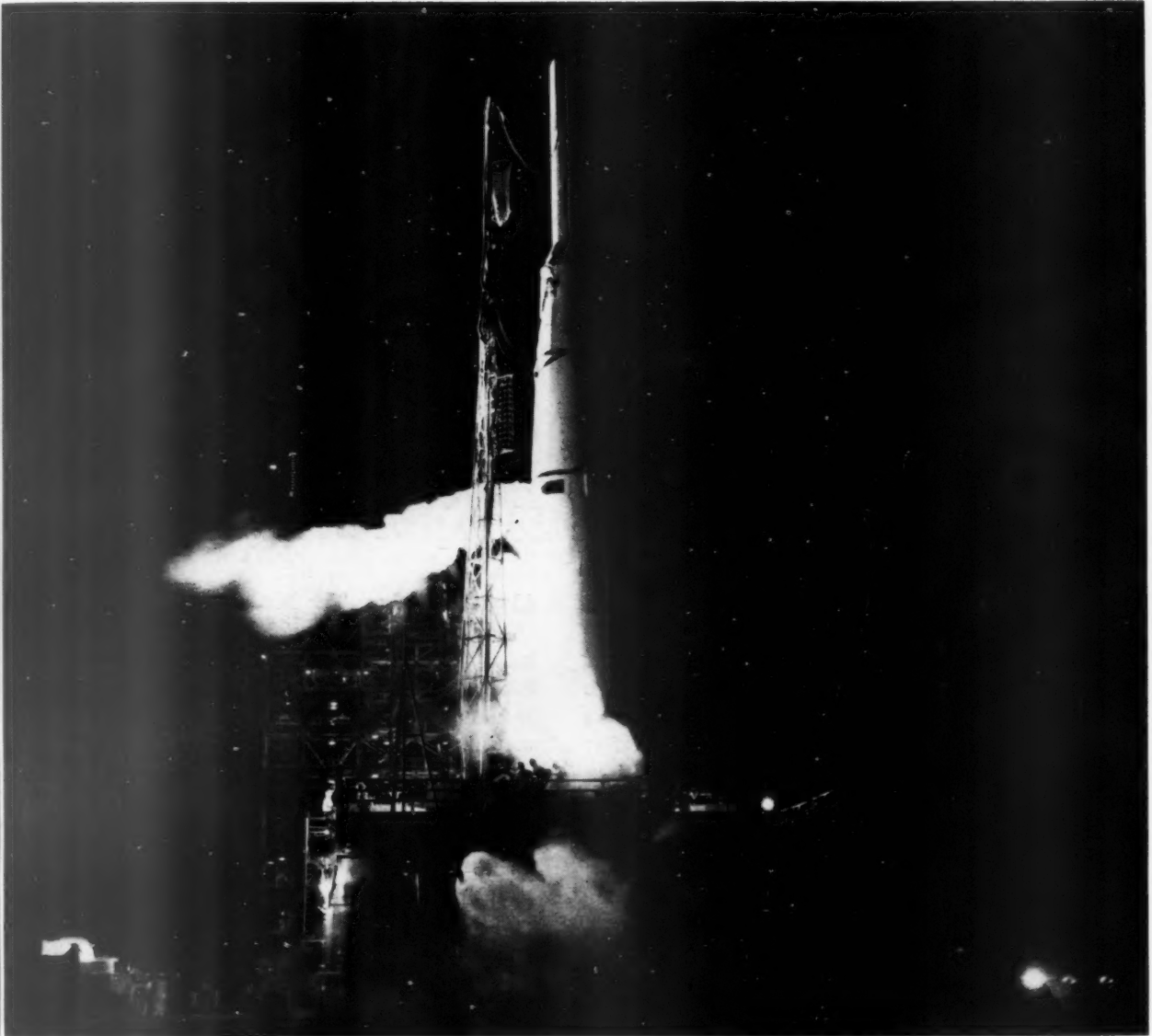


REFERENCE COPY

ARMED FORCES management



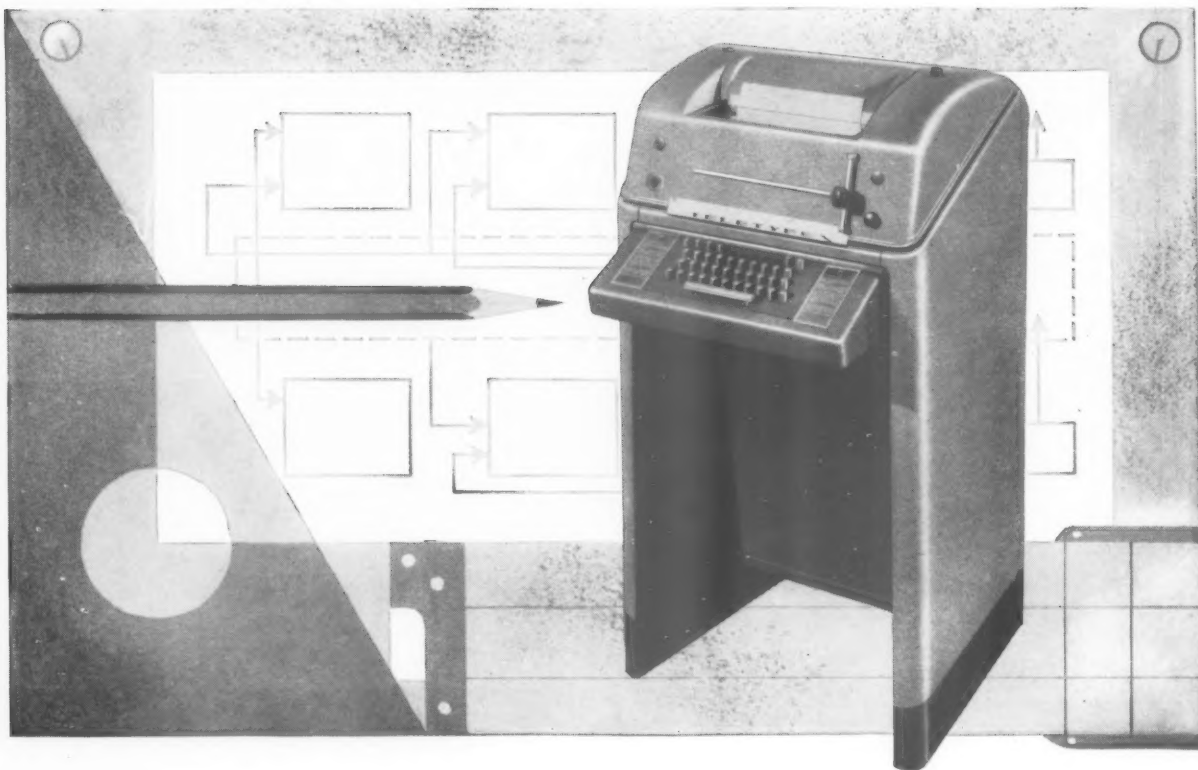
PUBLISHED FOR THE ARMY, NAVY, AIR FORCE, COAST GUARD AND MARINE CORPS



Quality Control: Making Sure the Missiles Go .. p. 10

Does Low Bid Mean Lowest Price? p. 13

complete contents ... p. 3



Teletype designs for continuous operation

Dependability—the inherent ability to stand up under the grueling punishment of continuous operation—is a Teletype tradition, tested over the years in a wide variety of demanding applications. The new Model 28 Line was designed in this tradition of dependability and ruggedness, with feature after feature provided to insure long periods of attention-free operation.

All-Steel clutches, designed on internal expansion principle, give firm, uniform and accurate engagement, cycle after cycle. There is no load when idling. The lubrication interval in 100-word-per-minute operation is 1,500 hours—or 9,000,000 words.

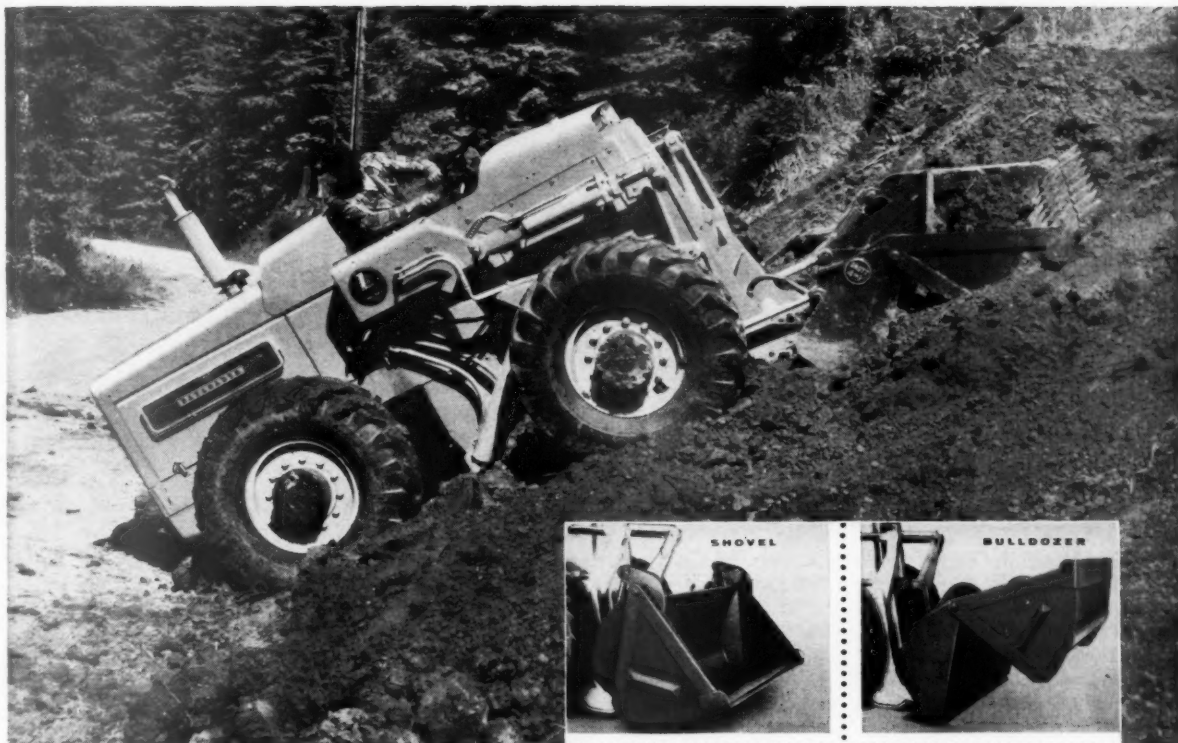
Type box printing and featherweight carriage provide smooth, quiet operation, unaffected by tilt or vibration, assuring dependable transmission and reception aboard ship, plane, or truck. The type box is removable in seconds, without tools, for cleaning or interchange. Type alignment is built in.

Modular design. The Model 28 page printer and the other units in the 28 Line were designed for maximum interchangeability of components, mechanisms, and parts, simplifying "spares" requirements and greatly facilitating the training of personnel.

If you'd like detailed information about the Model 28 printer—or other apparatus in the Model 28 Line such as the ASR automatic send-receive set, or the tape punches and readers—write to Teletype Corporation, Dept. 72H, 4100 Fullerton Avenue, Chicago 39, Illinois.

TELETYPE[®]
CORPORATION
SUBSIDIARY OF *Western Electric Company INC.*

For more facts request No. 101 on reply card.



1 PAYLOADER®

but it's a bulldozer . . . a clamshell . . . a scraper . . . a shovel

One of the many useful attachments available only on a "PAYLOADER" in the rubber tired tractor-shovel field is the patented DROTT 4-in-1 bucket. With this bucket your "PAYLOADER" handles many more jobs than any other tractor-shovel . . . enables you to do jobs you may now be doing with hand labor . . . eliminates the need for several special machines . . . and it keeps your "PAYLOADER" busy every hour, every season.

It's a bulldozer

Open the clam lip full and you have a sturdy bulldozer with hydraulic, finger tip blade pitch control to regulate dozing depth.

It's a clamshell

Use the powerful clamshell action to pick up materials, from stockpiles or windrows, without tractor

travel. Picks up huge boulders, stumps, making it ideal for land clearing.

It's a scraper

With slight clam lip opening, you have a handy scraper that loads itself, carries, dumps and spreads. Strips sod or grades with great accuracy.

It's a shovel

The 4-in-1 bucket can always be used as a regular tractor-shovel bucket to dig, carry and dump in the regular manner.

No other tractor-shovel gives you the versatility of a "PAYLOADER" with its many attachments including Back-hoes, Spreaders, Side Booms, Crane Booms, Sweepers and Snow Plows. See your "PAYLOADER" distributor today, or send for complete details.

HOUGH®

THE FRANK G. HOUGH CO.
LIBERTYVILLE, ILLINOIS
SUBSIDIARY — INTERNATIONAL HARVESTER COMPANY

THE FRANK G. HOUGH CO.

11-B-4

981 Sunnyside Ave., Libertyville, Ill.

Send full data on 4-wheel drive "PAYLOADER" models with DROTT "4-in-1" buckets to:

Name _____
Title _____
Company _____
Street _____
City _____ State _____

Compare these Rail vs. Air fares and travel times!

NEW YORK TO EL PASO

By train: \$116.75 — 52 hrs. 45 mins.
(including Pullman and meals)

By plane: \$113.15 — 6 hrs. 5 mins.

SAVINGS BY AIR:

Time — 46 hrs. 40 mins. . . . Money — \$3.60

You'll find it frequently costs you less to FLY your men than to move them by slow surface travel! Not only is a Scheduled Airlines ticket often cheaper but you save pay dollars, per diem allowances and unnecessary stop-over expenses! And remember, flying is five times faster! You'll have the advantage of men on the job . . . not "on the way" . . . via the fast, dependable Scheduled Airlines. Be sure to call The Scheduled Airline representative nearest you for a cost comparison before you arrange your next military movement.

10% Discount for Official Travel on TR's



ALWAYS ASK . . . "HOW MUCH BY AIR?"



THE CERTIFICATED

Scheduled Airlines

OF THE U. S. A.

ALLEGHENY AIRLINES
AMERICAN AIRLINES
BONANZA AIR LINES
BRANIFF AIRWAYS
CAPITAL AIRLINES
CENTRAL AIRLINES

CONTINENTAL AIR LINES
DELTA AIR LINES
EASTERN AIR LINES
FRONTIER AIRLINES
LAKE CENTRAL AIRLINES

LOS ANGELES AIRWAYS
MOHAWK AIRLINES
NATIONAL AIRLINES
NEW YORK AIRWAYS
NORTH CENTRAL AIRLINES

NORTHEAST AIRLINES
NORTHWEST ORIENT AIRLINES
OZARK AIR LINES
PACIFIC AIR LINES
PIEDMONT AIRLINES

SOUTHERN AIRWAYS
TRANS-TEXAS AIRWAYS
TRANS WORLD AIRLINES
UNITED AIR LINES
WEST COAST AIRLINES
WESTERN AIR LINES

For more facts request No. 103 on reply card.

ARMED FORCES management

PUBLISHED FOR THE ARMY, NAVY, AIR FORCE, COAST GUARD AND MARINE CORPS

AUGUST, 1959

Volume 5—No. 11

FEATURES

- Quality Control: Making Air Force Missiles Go** 10
If it won't fire, the cheapest missile in the world does the Air Force no good. This is what AF is doing to make sure that all of their missiles will fire when they are supposed to.
- Does Low Bid Mean Lowest Price?** 13
The answer is neither yes nor no—but this story offers the criteria which must go into fair evaluation of bids, and a system of subcontracting that has worked well.
- MATS and the Mission** 15
In the barrage of criticism that has been levelled at the Military Air Transport Service, many people have lost sight of the basic questions involved. These are the issues.
- A Memo on Mismanagement** 18
Reader Leland B. Kuhre comments on a few Pentagon problems—and offers a solution.
- Researching Success in the Military Market** 20
Seventh in a series on military-contractor relationships.
- What Makes Good Pilots?** 22
Both sides are presented in the long standing argument on whether Navy should contract out its primary pilot training.
- Black Saturday at BMD** 26
The first of two articles—What Team Management Means to the Ballistic Division—in which author Col. Robert Getz details the way in which Air Force is running its missile program—and why it is successful.
- Why Commercial Re-Supply Works in the the Far North** 31
A more efficient way for supplying U.S. Arctic bases.
- Reorganizing and Maintaining Momentum** 36

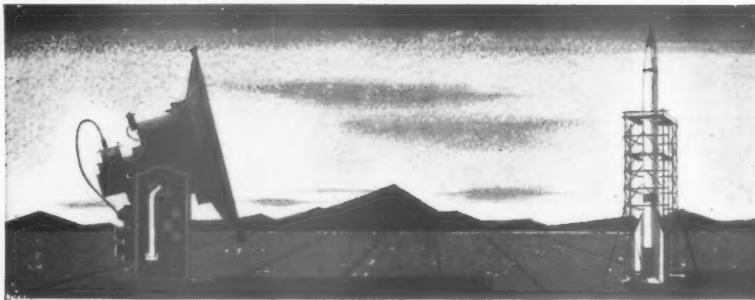
DEPARTMENTS

- | | | | | | |
|-----------------------|---|------------------------|----|------------------------|----|
| In My Opinion | 4 | Pentagon Profile | 34 | Your Investment Future | 47 |
| Editorial | 5 | Procurement Trends | 39 | Dates to Circle | 48 |
| Washington Background | 7 | Research Rundown | 42 | Advertisers Index | 48 |
| | | Association Newsletter | 45 | | |

FEATURED NEXT MONTH

What Industry Thinks About the ASW Problem . . . Are You a Space Age Executive? . . . Black Saturday at BMD.

Published monthly by Professional Services Publishing Company, a subsidiary of American Aviation Publications, Inc., Washington, D.C. Printed at The Telegraph Press, Harrisburg, Pa. Accepted as controlled circulation publication at Harrisburg, Pa. and Washington, D.C. Copyright 1959 by the Professional Services Publishing Company. Title registered U.S. Pat. Off. Four weeks' notice before next publication date required for change of address. Subscription Price: \$10.00 a year in U.S. and Canada, \$15.00 overseas.



Price Cutting vs. Economy

Competition can be the life of progress; indiscriminate price cutting, the death of it.

One of my favorite stories concerns the farmer who had to cut costs in order to compete successfully in the market place. He arbitrarily cut the ration of oats consumed by his mule each day. This he did over a period of time and, although the mule "kicked" about it, the farmer continued to demand a full day's work from him. The economy of the reduced rations pleased the farmer, but the mule died of malnutrition. Even when customers "kick" about prices, manufacturers must avoid, at all costs, the mistake of indiscriminate price cutting to remain competitive. It is our responsibility to find and eliminate the sources of waste in our operations in order to hold prices down. We must also adopt all possible improvements in engineering, manufacturing and marketing techniques. This approach is the only feasible means of providing improved products at lower cost to the ultimate consumer.

In the current race for technological break-throughs occasioned by the advent of the Space Age, we component manufacturers must design and produce, within a realistic budget, the required equipment at a reasonable price. This "price" cannot be arrived at by arbitrary price cutting if we are to remain solvent. We must convince buyers and contracting officers that: 1. A reasonable profit is necessary to perpetuate a business. 2. Prices must allow for equipment replacement and obsolescence. 3. Prices must support a reasonable Research and Development effort.

If we fail in this task, it is conceivable that the buyer will awake some fine morning to find that the mule is dead.



George J. Pandapas
George J. Pandapas
President

ELECTRO TEC CORP.

P. O. Box 37P. SOUTH HACKENSACK, N. J.

Products of Precision Craftsmanship



For more facts request No. 104 on reply card.

In My Opinion

Error Cited

In your July issue, you published a very informative article entitled "Comparison of Major Computer Systems." Needless to say, with nearly 300 LGP-30 Computers installed and operating throughout the U.S., we welcome such a comparison, as the LGP-30 has earned a highly respected place as one of the most popular and most reliable console type computers.

It is unfortunate that the comparison showed the LGP-30 twice, implying that it is available from two sources, and further that the price and reliability figures are not consistent. Therefore, it is important that your readers understand that while Librascope, who has manufactured digital computers since 1937, does manufacture the LGP-30 to Royal McBee specifications, they have no function in either marketing or service. Royal Precision Corporation, and of General Precision Equipment Corp. are charged with the responsibility of developing our electronic data processing and computer systems while Royal McBee has the sole responsibility of marketing and service.

Further, it is unfortunate that a 93% reliability figure was quoted when the national reliability is in excess of 95%. The established price is and has been \$43,500 to the government since July, 1958, and the regular commercial price is \$49,500.

We apologize for any confusion this may have caused among your readers and to your very fine magazine through erroneous source material.

A. T. Craft

Vice President
Data Processing Div.
Royal McBee Corp.

Difference of Opinion

In reading through the June issue of ARMED FORCES MANAGEMENT, I came across the paragraph at the top of page 40 in which you discuss the Combat Development Experimentation Center. I know you are interested in the Center and the Army's plans for it. However, some of the comments in your paragraph seem to me to be inaccurate. I have listed the specific statements with which I disagree, and have followed up each one with the actual facts pertaining thereto:

Statement—CDEC has problems, is beginning to look like a candidate for the ax it almost got last month.

Fact—CDEC was declared a permanent activity of the Army on 31 May 1958.

(Continued on page 6)

ARMED FORCES MANAGEMENT



Executive Editor
C. W. Borklund

Associate Editor
Fred Hamlin

Art Director
William H. Martin

Asst. Art Director
Basil Guiley

Production Manager
John Walen

Asst. Production Manager
Elsie Gray

★
Business Staff

Publisher
Edward D. Muhlfeld

Advertising Sales Manager
Walton E. Brown

Circulation Manager
Eugene White

Advertising Service Manager
Lee Martin

★

Regional Advertising Offices
New York 17, New York
20 East 46th St.
YUkon 6-3900

Beverly Hills, Calif.
8929 Wilshire Blvd.
OLEander 5-9161

Chicago 2, Ill.
139 N. Clark St.
CEntral 6-5804

Detroit 2, Mich.
201 Stephenson Building
TRinity 5-2555

Geneva, Switzerland
Anthony Vandyk
European Director
10 Rue Grenus
Phone: 321044
Cable: AMERAV GENEVA

London W.I., England
Frank V. Norall
Norall & Hart
28 Bruton St.
GROvenor 8356

★

Published monthly by Professional Services Publishing company, wholly owned subsidiary of American Aviation Publications, Inc., 1001 Vermont Ave., N.W., Washington 5, D.C. Telephone: STerling 3-5400.

President
Wayne W. Parrish

Vice Pres. and Gen. Manager
Leonard Eiseler

Vice Pres. and Editorial Dir.
Fred S. Hunter

★

Unsolicited manuscripts should be accompanied by a stamped, self-addressed return envelope. Armed Forces Management does not assume responsibility for the return of any unsolicited material.



AUGUST 1959

EDITORIAL

What Price Paperwork?

IN THEIR more effervescent moments, Pentagon wags have sometimes suggested that the simplest and most accurate way for Defense Department managers to tell how well they are running the business would be to run a check on how much paper they use each month. Since the Pentagon's only tangible product is paperwork (latest estimate: 30 tons per day), the humorists' theory runs something like: The less paper used, the better the management.

Last month, ARMED FORCES MANAGEMENT received some glimmering indication that this proposal may be more fact than sarcastic fancy. On 30 June, in a relatively small (3 persons) but influential office in the Pentagon, one AFM reader noted a two-sentence one-paragraph item in the magazine with which he violently disagreed. One month later, on 30 July, the secretary to a high-ranking Pentagon official dropped a two-page letter in the mail which told AFM why "You are wrong."

Certainly, the object here is not to contend that the letter should not have been written. Accurate information at any cost is far more valuable than erroneous information, even it's selling for a penny a ton.

But, the reasons it took one Pentagon office 30 days to compose a two-page letter make a story all by themselves, should provide Pentagon parishioners with some clue to what can happen in a military staff operation when "good business management practices" are spared the heat of constant emphasis and attention.

In the final analysis, Pentagon decisions move on paper. If the above travesty is an example of average performance, critics may have a point in lambasting Pentagon's slowness to make up its mind. Some statistics:

1—Seven officers had a chance to hack at the proposed letter before it finally reached the official signer.

2—Each hacker nit-picked a detail in grammar, composition or phrasing (but no one changed the basic message at all) and each nit-pick required that a secretary re-type the letter—including, each time, six carbons.

3—There were eleven "coordinating" telephone calls involved, including one long distance.

4—Not counting messenger boys, secretaries, and civilians "exposed to the problem" at least two officers made a total of eight trips down the hall with "letter drafts." Total walking distance: Approximately 3½ miles. Lost working time: Two hours.

Point is, it would appear that a two-page letter could be written with a good deal less "blood, sweat and tears" by exercising a good deal more common sense. Example: At least in this case, there is a regulation (to help those not gifted with practicality from birth) which says that messages will go as high as possible from author to signer in the original rough draft form, with each nit-picker looking at the same original rough draft before anyone thinks of typing a final copy. This would have saved the wasted paper, secretaries typing time, and several other wastes involved. Then too, exposed to the some times ludicrous peregrinations of other comma cutters, the in-channel critics might have tended to be a little bit more realistic. However, the regulation was pretty well ignored as, we understand, it is in the habit of being.

Delving at length into the "why" of all this would provide a case-history field day for experts in organizational relationships. No delegation of authority, a fear (uncorroborated by boss's personality) that the staff will make a mistake incurring the boss' violent anger, the boss setting a nit-picking example copied by subordinates, lack of checks by top level officials to determine if instructions (like the regulation noted above) which they issue are followed by subordinates—these are only a few of the "good management" violations. In what yet uncounted year of our Lord is the vast wealth of Pentagon brain power going to begin to be used for something besides wheel spinning and mutual protection of posteriors?

Bill Borklund

CAE...

PRODUCERS OF SPECIALIZED POWER

J69-T-29A

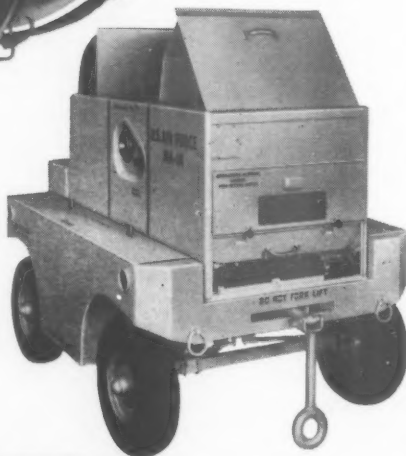
1,700 lb.-thrust model for drone applications. The new engine has 60% more thrust with only a 6% increase in weight. It is presently powering the Ryan Q-2C target drone which recently underwent successful flight tests.



J69-T-25

Latest power plant for the Air Force T-37A twin-jet trainer manufactured by Cessna, the J69-T-25 has increased thrust to 1,025 lbs.

Continental's TC-106 turbine air compressor, developed in conjunction with the United States Air Force, is now available for ground support of jet age aircraft. The unit, supplying low pressure air, is especially suited to engine starting, cabin air conditioning and actuation of electrical generating equipment for ground operations of the aircraft.



CONTINENTAL AVIATION & ENGINEERING CORPORATION

12700 KERCHEVAL AVENUE, DETROIT 15, MICHIGAN

SUBSIDIARY OF CONTINENTAL MOTORS CORPORATION

For more facts request No. 105 on reply card.

(Continued from page 4)

In principal, expansion of CDEC capabilities was approved by the Chief of Staff of the Army at that time. However, decisions were withheld pending resolution of problems arising out of location. Department of the Army approval was given on 6 April 1959 to a recommendation made by the Commanding General USCONARC concerning permanent location, level of experimentation and troop support. With this approval, actions were taken by Department of the Army to activate some units and move others to Fort Ord to support an expanded CDEC program. This expansion includes addition of consideration of logistics to experimentation which formerly was primarily tactical.

Statement—Scarce money has already closed a portion of the operation.

Fact—No portion of the CDEC operation has been closed. The program is being expanded with the new capabilities which are being provided by the Technical Service Troops now being stationed at Ford Ord. Troop support has been increased from approximately 3000 to 4200 troops. Certain planned aspects of the Umpire Control System may be slowed somewhat due to fiscal reasons; however, even this is not sure as the added funds may be made available.

Statement—Many Army men feel CDEC is overlooking everything but Infantry.

Fact—CDEC experimentation to date has been primarily concerned with combined arms, company-sized units. The principal arms schools have all contributed heavily to the concepts undergoing evaluation. Most of the specific units tested have been mounted units. CDEC has also looked at the tactical application of certain weapons or weapons systems. One of the major experiments was the determination of the vulnerability of Army aircraft to forward area ground fires.

Statement—... is not coordinating with Army's Weapons Testing Boards.

Fact—CDEC is not in business to test weapons *per se*. CDEC does evaluate the employment of weapons and other equipment under varying tactical environments and concepts of use. CDEC has direct liaison with all of the Technical Services and the United States Continental Army Command Schools. This, in turn, puts CDEC in complete accord with what the Boards are doing and vice versa. CDEC has participated directly with certain of the Boards during evaluation of some weapons. The Boards are testing to determine whether current items of equipment are safe for use and meet military specifications. CDEC fre-

(Continued on page 48)

ARMED FORCES MANAGEMENT



Washington Background

AIR FORCE ACADEMY EFFORTS TO BUILD an airfield for pilot training at Lowry continue to stumble ineffectively. Air Force-appointed-15-man Board of Visitors (including leading figures from industry, education and Congress) recommended again last month, as it has since 1957, that the airstrip be built, seemed piqued that its recommendation hasn't been backed by more drive.

ALTHOUGH AIR FORCE IS STILL STUDYING the airfield plan, has yet to come up with a firm cost figure for the whole project, Congress is not giving them any help. Influential Capitol Hill members of the board did very little, in fact, to push an Air Force request for \$8-million in first-increment-construction through the last fiscal budget. (The request for money was denied.) Likely result this year: More of the same.

LIKE ANTS AT A PICNIC or gnats circling a perspiring brow, Congressional committees have been pestering the Pentagon with several relatively insignificant investigations during the past few months, probably will continue to do so until the end of the current session. The inquiries make good political conversation, but Washington observers are convinced that in terms of time, money, or efficient operations the outcome will be less than significant. Among the buzzing bugs:

1—Industry hiring of ex-officers—likeliest legislative outcome this year will be no legislation at all (unless possibly a standardization on one rule. Army and Air Force officers currently are prohibited for two years, Navy men for life). Said one spokesman: "Not only is there no real merit in the influence contention but, if we look at this thing hard enough, Congress itself is by far the biggest influence peddler working on the Pentagon."

2—Manpower utilization or "how come all those (2400) enlisted men being used as servants?"—another popular appeal item, the issue, in terms of total military manpower, amounts to peanuts; and, said one Pentagon watchdog, "How do you legislate what tasks military personnel can perform and which ones they cannot?" For that matter, he added, "Enlisted personnel turnover per month is almost three times (some 6000 persons) the number of people in question here. If we want to talk about a real problem, let's talk about that one."

3—The "Munitions Lobby"—likely to be a political issue next year, has never really been defined nor, in its sour connotation is it likely to be—based on testimony to date. Consensus is that smart politicians (who want to make voting hay of the issue) will not let it be defined, at least until after the fall of 1960.

PLACED IN PERSPECTIVE, most of this is a Congressional chewing away at the environs of the main theme: how good are today's government procurement practices? Until the problem of negotiated versus advertised procurement is tackled head on, Congress will be reluctant to risk upsetting the present applecart merely to replace one or two spokes in a wheel.

AND UNTIL TIME STOPS collapsing, technology slows down its revolution, it is also unlikely that the Services will be told to abolish negotiated procurement. One military procurement officer summed it up this way: "How do you call for advertised bids on a flying saucer if no one has ever done it before?"

ALONG THE SAME LINE, Congressional experts are claiming the sizeable cuts in the Budget of the National Aeronautics and Space Administration will stand up. The reason: NASA costs cannot be justified as backing up national defense (and "everybody is in favor of national defense"). Based on grass roots reaction, Congress is now trying to out-economize the economy-minded U.S. President, has neither one of the basic requirements they need for making progress and still protecting the vote. Thus, Pentagon has little trouble getting twice as much money for missile research, NASA must struggle for enough dollars to try to take one shot of the other side of the moon.

SMALL BUSINESS RE-DEFINED

A new small business definition—pertaining to aircraft equipment and parts—will include firms up to 1000 employees. Previously, the standard was 500 or under.

Small Business Administrator Wendell Barnes said the change had been endorsed by Air Force, and added that it relates "only to the manufacture of a few of the major aircraft assemblies and components, for which set-asides have not been made."

Although the redefinition represents the first tiny crack in the time-honored "500" limit, it is a far cry from an adequate solution to the perennial small business problem. Pentagon personnel working with small business administration point out that it is virtually impossible to handle a problem as complex as small business by simply laying down an arbitrary employee limit.

What is needed would appear to be a system which offers flexibility—regarding employee numbers, size of contract involved and competitors.

Ideally, such a system would also provide for small firms which outgrow their employee limit by a slight number to either remain as "small" or at least be given a waiting period before being classified as "large." This would allow small firms taking advantage of a short-lived prosperity to retain more of the profits and benefits of short term success.

A measure of the unrealistic nature of the new "definition" is shown by the way in which it is limited to the aircraft industry. A 750-employee firm holding government contracts for both aircraft tires and truck tires would, under the new definition, be both "small" and "large," depending on which of its contracts were being considered.

GAO EXPANDING

General Accounting Office is reportedly expanding its auditing-of-defense-contracts role in to whether or not test objectives and reliability are met, may, if carried far enough, raise one more bureaucratic roadblock to progress. GAO interest in technical aspects of performance is reportedly already beginning to plague the ballistic missile program. The problem: Can an auditor make technical military evaluations in terms of dollars and cents? If trend continues, it is likely that Congress will be asked to re-define the role of the agency to make clear where the audit function ceases.

THE LEGAL BURDEN

Over-legislation burden Pentagon must carry in striving to improve its business operation was highlighted again last month following Army's report (to itself) that it had overpaid its civilian employees some \$11.5 million during 1958 (due to grading civil service jobs higher than subsequent analysis proved they were worth).

Army, which does as well if not better than anyone else in handling its civilian personnel management problems, noted that grading errors, once made, take two years to correct (law protects the individual graded this long) and this civil service regulation "Tends to minimize the possibility of discontinuing overpayments based on incorrect grades." Added to this: Army noted a "serious need for training of salary and wage staffs" (since 45% of the in-

correct payments were due to mis-evaluation by S & W analysts).

Brightest aspect of all this: Pentagon plaudits being earned by Army for its frank, above-board disclosure of its problems, giving it a far better chance of easing its headaches than would the close-mouthed, "best foot forward" dissertation too often presented by too many other government organizations in a similar predicament.

FRAME OF MIND

The Congressional frame of mind was brought to light in a Capitol Hill corridor one day last week. Understanding it can make an oracle out of anyone who studies pending Congressional legislation. The philosophy in essence: "No matter how idealistically right your arguments are, they don't amount to a thing if you don't have the votes."

Latest example in the passing parade: A considerable share of Congressional backing for higher military manpower strength levels is prompted by fear in some Congressional circles that a reduction in strength will mean the closing of forts, camps and installations in several Congressional districts—"Which will upset my constituents and could cost me an election." Thus, among several politicians, it is not the arguments of more men for better defense that are drawing the water, it's "Man, how does this affect my voting strength?" "The trick," said one legislator, "is to protect the votes and still crusade for better defense posture—as long as it doesn't cost any more. This keeps you in tune with the times."

MISSILE MEN RE-ASSIGNED

The two top men in the old Guided Missile Office of the Secretary of Defense have been re-assigned to new jobs. Former Missile Director William Holaday has been named full time chairman of the Civilian Military Space Committee.

Holaday's Deputy, Brig. Gen. A. W. Betts (see Pentagon Profile, Oct. 1958 AFM) has been appointed military advisor to Defense R&E Director Dr. Herbert York. With these changes the Guided Missile Office has been essentially eliminated. Its responsibilities will now fall directly to Dr. York.

Holaday's new job will consist largely in mediating disputes between National Aeronautics and Space Agency and Defense.

AF STILL WANTS C-JETS

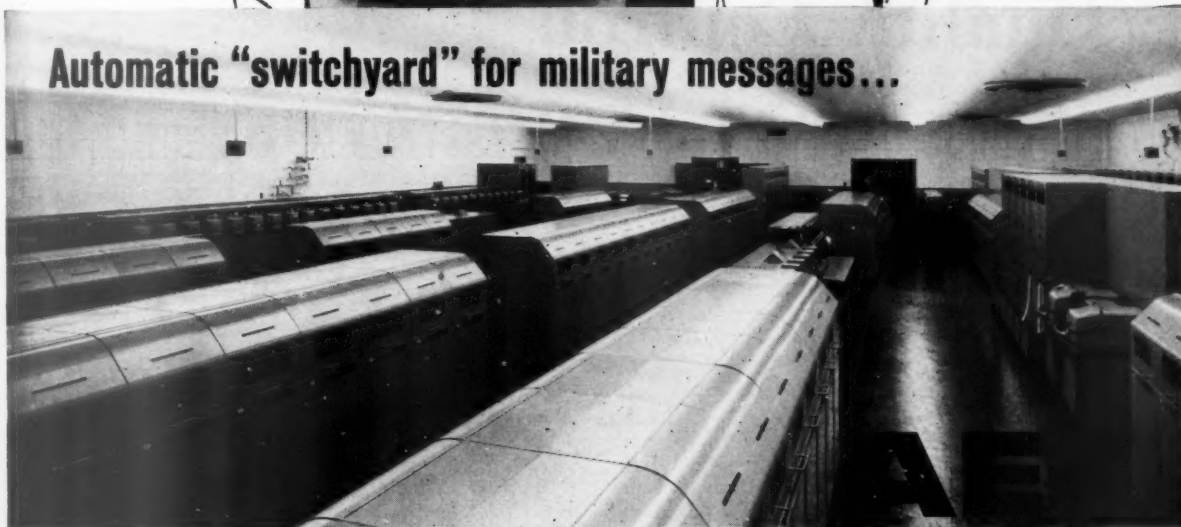
Air Force has renewed its bid to Congress for appropriations on an all-jet all-cargo aircraft program. The earlier AF request—for \$50-million—was turned down by both the Senate and the House.

In support of the program, Sen. Howard Cannon (D-Nev.) has told a Senate Appropriations Subcommittee that "MATS still does not have a single turbojet aircraft in its strategic fleet and must still depend on the outmoded C-124s for its principal airlift of both men and material."

In spite of the many reasons in favor of the program, there does not seem to be much chance that the measure will be in this year's budget. However there is a possibility that a supplemental appropriation for this purpose will be introduced, and possibly passed.



Automatic "switchyard" for military messages...



Teletypewriter Switching Center at Davis, California

AE has developed the switching techniques and control devices that automatically route messages to the proper commands, give instant priority to emergency traffic.

Messages arrive at Teletypewriter Switching Centers on coded tape. The codings indicate whether messages have a single or multiple destination, where they are to go, and the degree of their priority. AE automatic switching systems do the rest.

Switching such as this is AE's business. If you have a tough project in communications or control, AE is ready to take it on. Just write the Manager, Government Service Division, Automatic Electric Sales Corp., Northlake, Illinois.

AE CAN DO



AUTOMATIC ELECTRIC

Subsidiary of
GENERAL TELEPHONE & ELECTRONICS



MAKING IDEAS WORK

AUTOMATICALLY



For more facts request No. 106 on reply card.



Quality Control:

Making Air Force Missiles Go

Reliability in each of the nearly half a million parts in a ballistic missile is a must for successful firing. This is what the Air Force is doing to make sure that the missiles don't miss . . .

WHEN the Vanguard which was to carry the first U.S. satellite into orbit fizzled on its Cape Canaveral launching pad on December 6, 1957, it dramatically signalled two brand-new beginnings: First, the United States was officially and publically entered in the race to space. Second, and no less important, a need for hardware reliability of an unprecedented degree was stated in the most uncompromising terms.

Although reliability problem is not new with the space/missile age, there has been no time in military history when this has meant as much to the success of the military mission. This, with the transition from aircraft to missiles, has faced military buyers with a situation for which they have virtually no useable precedent.

In the past, reliability was nice to have, and much time was spent by government and industry to make sure that military equipment would do the job it was supposed to. But in the simplest example, the soldier with a rifle that wouldn't fire could always use the weapon as a club. In a

more complex situation, the airplane that developed in-flight problems could often be coaxed to a landing by its pilot and repaired for further service.

In these examples, the man is the saving grace. There is no pilot on the ballistic missile. When the final countdown ends, the man's work is done. Once the missile is on its way, there is no way in the world for it to be called back for repairs. In simple terms, this means that each of the 300,000 parts in the missile must function perfectly.

Says Maj. Gen. Ben I. Funk, commander of Air Materiel Command's Ballistic Missile Center, "I accept the fact that perfection is impossible, but whatever the nearest thing to perfection is, that's what we need in the weapons we are developing and producing today."

To get the nearest thing to perfection, Gen. Funk lists quality as the number one of his top three priority items. The sequence Funk has set is Quality, Schedule and Cost. Put simply, if the missile doesn't work, it makes little difference when it gets to the Air Force inventory on time—



and the bargain.

At the insurance probably stallion worth of in the Force equipment.

Says fastest, weapon must ex these sy and we

To i meet th scratch. faced v Things sudden,

For Force H superfic accepte Air For for stri fueled i investig was lea bers, pr

In an with no lower-ti made u The sub substitut tures ca

The I

Thes missile part, al ity Ass

The med up control surance product tions. Y than th

Says ance O proach ments i what is led to c the cos posals. ment i for awa the con the con

Lanc the ba Whethe charact of weig a chara

AUGU

and the cheapest missile in the world, if it won't fire, is no bargain.

At the Air Force Ballistic Missile Center, Quality Assurance (including both reliability and quality control) is probably more vital than at any other single military installation. Because BMC is doing some two billion dollars worth of business each year, and because national security in the missile age will depend largely on what the Air Force—as our strategic strike arm—has in the way of equipment, it is hardly surprising that this is the case.

Says Gen. Funk, "We must develop and produce the fastest, most accurate, most reliable, most indestructible weapon systems that science and industry can deliver; we must exploit the brainpower of the nation in order that these systems may be created, operated, and maintained, and we must do all this within the limits of our economy."

To insure the reliability and quality needed to help meet this goal, Air Force has had to start almost from scratch. Says one Quality Assurance officer, "We are being faced with problems that were never anticipated before. Things that used to be to insignificant to pick up all of a sudden, reliability is a magic word."

For example, before entering the missile business, Air Force had little need for liquid oxygen, and only the most superficial quality controls. Pure or impure, the LOX was accepted more or less as it came. This is not to say that the Air Force was not doing its job—there was no real need for stricter requirements. Then it was found that liquid-fueled missiles using the LOX were not up to par. Further investigation showed that as it boiled off, the liquid oxygen was leaving hydrocarbon deposits in the missile fuel chambers, preventing top system performance.

In another instance, a missile failed to function properly with no apparent cause. Then Air Force found out that a lower-tier subcontractor had—without checking it out—made a minor improvement in the valve he manufactured. The subcontractor had changed the type of resin he used, substituting a substance which congealed at low temperatures causing valve malfunctions.

The Problem's Answer

These, and the classic example of the million dollar missile that failed for what of performance in a ten-dollar part, all point to the tremendous job that Air Force Quality Assurance people must face.

The answer to the problem Air Force must face in summed up by one BMC officer: "We want a total quality control and reliability program. This includes quality assurance in all phases of the missile work—development, production, transportation, maintenance, storage and operations. You can see why BMD tells us we bite off more than they can chew."

Says Jack Lancaster, Chief of the BMC Quality Assurance Operation, "To date, there has been no uniform approach to establishing and enforcing reliability requirements in contracts . . . there is considerable ambiguity on what is actually required of the contractor. This ambiguity led to difficulty on the part of the contractors in estimating the cost of reliability when preparing competitive proposals. It also led to difficulty on the part of the Government in evaluating the adequacy of contractor proposals for award of contractors and later in determining whether the contractor has fulfilled the reliability requirements of the contractor."

Lancaster continues, "disagreement on terms is one of the basic problems we face in reliability." An example: Whether reliability is a function to be performed, or a characteristic of the finished product, such as size, speed or weight. The Air Force would like to buy reliability as a characteristic the way it now buys a given range for a

missile. Some contractors feel, on the other hand that a "reliability department" should operate independently of the weapon development and production, covering the various phases of reliability more or less apart from design and fabrication.

A corollary to the problem of defining the terms for future quality assurance work is that of standardizing the approach that will be used. To solve this, Air Force has an across-the-board reliability specification under development for ballistic missiles. The new specification will "outline the general concepts and approaches to our reliability problem. What we want to do is assure maximum contractor effort toward achieving goals established in the early state of development." In short, the specification will set the general requirements and basic elements for an efficient reliability program.

In setting up these elements, the new specification would require continuing studies to initiate and maintain quantitative reliability goals, covering all phases of weapons development from design to actual flight. The studies would also enable determination of possible trade-offs of such weapon characteristics as speed, safety, volume or storage life for greater reliability.

The specification would require contractors to have a



Failures are spectacular - but hinder progress

planned and scheduled program for functional testing of sample production units under environmental conditions to measure achieved reliability.

For the same reasons that the Weapons System concept has come into being—with greater emphasis on the contractor's participation in management—Air Force decided effective achievement of reliability would depend upon the responsiveness of industry to the problem. Under the proposed specification, the second step—giving Air Force a means for checking out their contractor's work will be put into operation.

Another measure BMC's people will have set up is a responsive data feed-back system on components that fail. Air Force wants to find out as soon as possible after a failure what went wrong, and how to prevent recurrence of the failure. Air Force wants its contractors to identify a single responsible activity for data analysis, with authority to assure timely corrective action. This, says Lancaster "will do much to measure overall quality."

Possible means to this end are suggested by Gen. Funk. "To assure effective malfunction analysis I believe three

The Nearest Thing to Perfection

things are particularly necessary: first, we must have competent professional engineers at the test centers with the sole responsibility of conducting immediate field analysis of failures; second, we must have a system which assures rapid feed-back of failed parts for laboratory analysis when required; and finally we must centralize management of the malfunction problems at the factory level to assure correlation of field and laboratory data and direct necessary action."

In connection with the surveillance problem BMC reliability people want better mathematical and statistical tools and analytical techniques. Specifically, says Lancaster, "it is quite apparent that a surveillance program for reliability similar to the one now exercised over contractors' quality control system would be necessary. Such a surveillance program would require highly qualified professional engineers with suitable training in statistical concepts and methodology." Again, the desire is for an accurate and thorough method for evaluating and verifying contractors' production efforts without having to maintain an unwieldy staff.

Closely tied with this is the need for qualified personnel. Men trained in aerodynamic engineering have only a smattering of the training needed in missile work. Says Capt. Thomas McDermott, Director of Plans and Engineering in BMC's Quality Assurance Office, "In-flight guidance offers a good example of the personnel situation. With aircraft, over the past fifty or so years, we have established predictable aerodynamic laws. But with the missile, most of these laws have gone out the window. Guiding a missile is like pushing a piece of string straight up in the air."

These are some of the basic problems, and the general solution that BMC has planned or accomplished. There will continue to be the constant day-to-day headaches that are inherent in an operation of this kind. These day-to-day problems are multiplied by the rapid weapons system changes brought about by technological advances.

Headache Number One

Foremost of the immediate headaches at BMC concerns the liquid propelled long range missiles—Thor, Titan and Atlas. For the first time since they began working with missiles, the Air Force Quality Assurance people will have to consider operational missiles, instead of the research and development versions of the big birds. Top priority here goes to "maintaining staff surveillance over the installation and checkout of operational missile sites." The quality assurance people are now beginning to be concerned with the acceptance of production hardware.

If anything, working with the operational missiles will be tougher than the research and development work. The work during research and development is to prove the inherent reliability of the design. After that, the concentration of quality assurance effort is on the achieved reliability of actual hardware. Says Lancaster, "The achieved reliability on any system is always highest when that system is on the drawing board." From there, reliability can only be maintained or degraded.

This is to say that an acceptable design on the drawing board is not enough. Quality Assurance must eventually deal with production hardware. Ideally, the reliability factor that appears in the drawing board missile would be maintained throughout its development. In actual practice, everything that happens to the equipment after release of the drawings tends to degrade the inherent reliability of

design. What Quality Assurance must do is to verify all design and test data on the missiles, then work closely with the contractor to insure that the workmanship that goes into the missile will minimize degradation of the original drawing board reliability.

Working with research and development hardware, a certain amount of failure is expected. The margin for error is balanced by such things as having contractor teams at the launch sites to immediately track down and correct any sources of trouble. On operational sites, no time will be available for fixes prior to launch. With warning time measured in minutes, the missiles will have to go the first time, or they may not go at all.

"The ultimate measure of a weapons system must be made in the field." Said one officer, "You never really know how well a missile will work until you're pretty well down the road. One thing that would help us out here would be some sort of a new specification that would relate missile testing more closely to the mission the missile will eventually perform."

The Future: Solid Fuels

At the same time that the transition to operational liquid propellant weapons is progressing, the Air Force is starting research and development work on the solid propellant missiles. Although Quality Assurance people will have their first missile work under their belts, they will have to modify the present methods to allow for the unique demands that will be posed by solid propellant missiles.

For ground support and operational people, the solid propellant missiles will mean a cheaper, simpler way of doing business. The long countdowns, the complex fueling problems and the tremendous amounts of ground support equipment will cease to be necessary. From the Quality Assurance standpoint, the implications of solid-propellant missiles are summed up by Jack Lancaster: "These new missiles will only make our work more critical. We don't yet know the problems that will be involved. There will be no allowance for the day-to-day type maintenance that can be used to replace faulty parts in the solid rocket motors."

There will be other unique requirements generated by the Minuteman-type missiles. For example, solid fuels tend to draw moisture. This will mean new storage techniques. Problems are expected, arising from the need for the missiles to stand ready for extended periods of time. These would include such things as chemical breakdown of the solid fuel, or oxidation which could tend to make the missile fail.

The job of the Quality Assurance office at the Air Force Ballistic Missile Center is not easy, and it is one that holds every promise of getting harder. But is a job that will be done—because it has to be. Promising advances have already been made in the Air Force with the cooperation of industry.

The missile reliability situation is summed up by Gen. Ben Funk, Commander of the Ballistic Missile Center: "In the case of the ballistic missile, failure in any component part may endanger the successful launch of the missile. In addition, if a component fails after the missile becomes airborne, the entire mission will fail. In both defensive and offensive ballistic missile capabilities, we are utterly dependent upon the functioning of complex mechanical and electrical components. This functioning does not only require that the equipment will do precisely what it is supposed to do, but that it will do so under all military conditions of use, and at all times of employment. This perfection is mandatory if we are to protect the nation."

fy all
y with
goes
iginal

are, a
n for
teams
correct
e will
y time
e first

st be
really
y well
here
relate
e will

liquid
start-
pellant
e their
ve to
ne de-
es.

solid
ray of
fuel-
d sup-
m the
solid-
caster:
e criti-
be in-
to-day
y parts

ed by
s tend
iques.
e mis-
These
of the
ke the

Force
holds
will be
ave al-
tion of

y Gen.
er: "In
ponent
sile. In
es air-
ve and
ly del-
al and
ly re-
is sup-
y con-
is per-
n."

MENT



SAGE console shown here was manufactured by Hazeltine Corp. for IBM, is only one of a wide range of military products.

Does Low Bid Really Mean Lowest Price?

Lowest contract bid, to too many people, means the lowest instantaneous price. This is only part of the true cost of equipment. A New York electronics firm has developed a formula for looking at the just-as-important rest of the picture. Here is how it works and why . . .

W. A. MacDonald, Chrm., Hazeltine Corp.



FAVORITE target of congressional committees, and a good many other critics at the moment, is the Defense Department's manner of letting contracts. Major argument is, of course, over how to buy at the lowest price.

Interestingly enough, the phrase "lowest price" among too many of the debaters assumes many things (about contractors and equipment) which are not necessarily so. Simple example: one apple is just as good as another; all manufacturers deliver on time. Thus, low bid has come to mean the lowest instantaneous price—an idea which may have held in the days of barter but defense procurement is, or should be, considerably more sophisticated than that.

Or is it? Defense contracting is still based to a large extent on a written back-up to the decision on who receives a contract. More to the point: the back-up is a personal evaluation. Even though made by a qualified individual, this method still leaves plenty of elbow room for second-guessing and Monday morning quarterback.

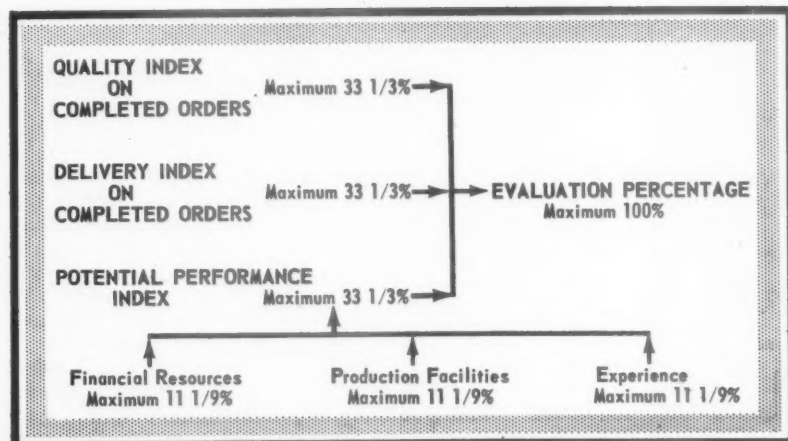
Lowest price should mean the lowest dollar value for the life of the equipment. Such things as on-time delivery, maintenance cost, equipment life all affect the real value of hardware. (Military maintenance cost, it is reported, runs something like twice the initial purchase cost of equipment every year.) Yet, there are few truly objective procedures, particularly on a tri-service basis, for pumping this information into bid evaluation.

This problem is becoming particularly critical under the weapons systems development concept. Aware of it, William A. MacDonald, board chairman of Hazeltine (electronics) corporation, has developed a simple formula he believes is a start toward the answer, has use-tested it in his own firm. Results have been impressive.

Essentially, MacDonald has tried to set up a formula the services can use. The idea: base decision on facts as much as possible rather than arbitrary evaluation, give a single figure of past, present and potential contractor capability. Reason the formula is being used at Hazeltine: "Competitive bidding without safeguards has no significance."

Goal of the "Supplier and Bid Evaluation System" is to hold down costs, price as economically as possible, provide greater quality assurance on military contracts. (Hazeltine does most of its business with the military, annually buys \$30-40 million-a-year in parts

The Formula . . .



and pieces from over 1500 suppliers. Between 70 and 90 per cent of the equipment is non-standard.)

The system can be used, says Hazeltine, to (1) arrive at an accurate estimate of the true cost of a supplier's anticipated performance to help in selecting a supplier and (2) after the order has been filled, to compute the true cost compared with the original bid to determine the advisability of placing future orders with the supplier.

The formula establishes an evaluation percentage for each supplier. That percentage is kept current and, when related to the supplier's bid on an order, indicates approximately how much the order will cost. When kept on punch cards, data can be translated immediately into evaluation percentages when bids are received. (Because Hazeltine can issue as many as 100-200 purchase orders a day, long-hand-filling-out of the form takes too long.)

How Does it Work?

How well does it work? In a recent application, vendor "A" bid \$168,800 on a sub-contract, vendor "B" \$175,930. However, the high bidder had an overall index (using the formula) of 92% and the low bidder an overall index of 84%. As a result, "A's" effective bid was \$9,724 higher than his competitor's. "B" got the contract. Says Hazeltine, "Past experience with vendor 'A' indicated that quality and deliveries did not meet expectations. Thus, his overall index was 8% lower than 'B's'."

It is conceivable, of course, that, because of comparative past performance, "B" would have received the order anyway—even if Hazeltine did not use its formula. Comments Mac-

Donald, "The system is not a substitute for management decision. But, it makes management a better decision-maker by providing facts and figures."

He adds, "Because our suppliers know we are using the evaluation system, they tend to be more accurate in their bids, in their promises of delivery dates and in the quality of their merchandise. They know that poor performance will seriously affect their evaluation percentage and their chances of acquiring future business from us."

Hazeltine developed the idea about four years ago, has been accumulating selected information (supplier financial status, merchandise quality, % of rejects, etc.) ever since, backs up supplier performance with occasional plant surveys—sometimes as often as every

six months. And therein lies the biggest problem in effective military use of the formula: it has no value without a Central Information Center to accumulate all the performance data, make it available to all military procurement officers.

"The information is there," says MacDonald, "but it has to be collected in one spot if this idea is to go anywhere." Most likely spot, at the moment: the Armed Forces Supply Support Center which is already collecting and codifying data on the kinds of equipment the Services buy, could most easily, say formula backers, go one step further and build up a file on who supplies the equipment and how well they do.

Hazeltine is well aware of the formula's implications in weapons systems management. It was one of the first companies in the business (back in World War II when it became systems manager for a large chunk of military electronic equipment, was, as a result, supplying more electronic equipment to the Services than the nation's two largest electrical manufacturers during the war's early stages).

Admittedly the formula and the idea are based on rather obvious facts of procurement life. But it is obvious, too, that too little is being done in the techniques of buying to keep it abreast of the technological revolution. This easy-to-follow idea could well be a start toward the answer. Hazeltine believes, and has proven by its own example, that military use of the formula will give the Services a better idea of what equipment is really going to cost when they place an order (whether the equipment is standard or not).

The Form . . .

REPORT ON EVALUATION OF BIDS		195	BUYER
HAZELTINE ELECTRONICS DIVISION, LITTLE NECK, N. Y.			
REQUISITION NO.	DATE OF REQUISITION	195	JOB NO.
TYPE OF MATERIAL		P. O. #	REMARKS
PRODUCT QUALITY INDEX _____ %	AMT. OF BID \$ _____	NAME OF FIRM _____	
DELIVERY INDEX _____ %	OVERALL INDEX _____ %	CITY WHERE LOCATED _____	
POTENTIAL PERFORMANCE INDEX _____ %		COMPUTATION	
FINANCIAL INDEX _____ %		EFFECTIVE BID \$ _____	
EXPERIENCE INDEX _____ %		PRODUCTION FACILITIES INDEX _____ %	



MATS and the Mission

Although the importance of its mission is the key to its entire operation, the Military Air Transport Service has been caught this year in a never before equaled barrage of diversionary charges—most, if not all, of them secondary and misleading.

Until the underbrush is cleared away, MATS, and the Air Force, are going to have a hard time reaching, with much desired commercial airline help, a much needed program for use of all U. S. support air power in the time of war...

by Bill Borklund

BOMBED, badgered and besieged as were few military outfits this year, the Military Air Transport Service enters the final round, this month, of a summer-long congressional hassle over how much money it should be spending on commercial airlift, how much of its military job it should do itself.

At the same time, undaunted by the battering it has taken, MATS is re-entering the Washington, D.C., arena with two far-reaching proposals of its own. One: A \$53 million supplemental appropriation request for 10 jet powered aircraft (which Capitol Hill whacked out of the original Defense money request) to start the long-overdue MATS modernization program. Two: a proposal that Defense start airlifting all personnel overseas (present levels—37% of Army, 50% of Navy, 94% of Air Force), double the amount of overseas shipping by air of high value hardware.

Either idea will be enough to start the whole argument again, an argument that centers around what MATS does and why. Strangely enough, all the mountains of obfuscating manuscript produced this year have done little to clarify the MATS mission, key to the whole argument. The result: means are discussed as ends, the result is called the cause and headline-hunting critics have led a big chunk of Congress (and most of the American public) down a bramble-strewn path of mis-information.

Among the baubles: MATS is the world's largest airline. It isn't even close. Soviet Russia's Aeroflot is No. 1 among the real leaders. In addition,

only about 30,000 of MATS' 120,000 Navy, Air Force and civilian personnel and half its 1198 assigned aircraft handle the strategic air transport mission. The rest take care of MATS' less-publicized services—Air Weather, Air Photographic and Charting, Air Rescue, Airways and Air Communications, and Aeromedical Evacuation.

MATS runs a plushy airline. The three VC-137A jet passenger planes which prompted this blast are indeed plushy, were built for the Air Force to fly the President, Congress and high-level U.S. dignitaries around the world, are actually off-the-shelf Boeing 707's with standard executive interiors. Assigned to MATS for administrative purposes only, the aircraft are actually under control of the Joint Chiefs of Staff organization. Nearly all other MATS passengers travel the austere equivalent of commercial tourist class.

MATS is competing with commercial airlines for passengers. Total passengers carried by MATS last year amounted to less than one percent of the 49 million annual passenger load carried by U.S. airlines alone.

MATS, like any other military organization, has a wartime mission, assigned by the Joint Chiefs of Staff.

MATS Four Engine Strategic Transport Aircraft

C-97	48
C-118	126
C-121	71
C-124 (TROOP CARRIER)	143
C-124	310
C-133	23
TOTAL	578

The mission: be ready to move troops, missiles and other heavy weapons and supplies in any war emergency to support other Air Force components, the Army, Navy and Marine Corps. JCS estimates wartime airlift requirements, specifies those that are "critical," i.e., must be handled by military aircraft and crews; pegs the rest "essential," i.e., can be done by either MATS or civil carriers.

Given a half-day to reach pre-designated spots around the globe to cover the "critical" tasks (primarily re-supplying Strategic Air Command bombers returning from their first bombing run), MATS keeps an alert force in on-the-flight-line readiness, runs the rest of its air fleet through practical training exercises. It is, in essence, a SAC-like supply operation with one exception. SAC must take pictures rather than drop its bombs. MATS can haul and process in peacetime training the same supplies it will actually carry if the big war should start.

To handle the bulk of the "essential" role, it has organized a Civil Reserve Air Fleet. Primary CRAF duty, at the moment: hauling passengers. CRAF list of planes varies depending on predicted requirements, is currently (FY '60) made up of 242 aircraft under assignment from 27 different civil carriers—primarily DC-4's for cargo, DC-7's for passengers. There is a slight hooker: for MATS to use any of the CRAF planes, under current agreements with the airlines, it must take them all. Result: MATS must take care of most limited war situations pretty much on its own.

To MATS its "realistic training" program is an absolute necessity if it is to have any chance at all of meeting

The World-Wide MATS Mission Covers Many Areas



Troop Transport



Air Weather Service

Air M

its wartime obligation. Said one colonel, "Letting pilots fly the aircraft is the very tiniest part of this whole training effort. We're got to train the traffic people, the maintenance men, cargo handlers, the whole crew."

"We have to know what we can move where and how efficiently. (Biggest problem right now is the terminal operation.) You can't mothball an operation like this, anymore than you can SAC, then push a button and have it spring into operation in the wink of an eye—which is how fast we'd have to get going on D-day."

Requesting six hours originally, MATS is allowed a 5-hour per day per aircraft utilization rate for training, has reasons for believing this isn't enough. Studies by RAND corporation and such men as Dr. Paul Cherington of Harvard Business School indicate MATS could not boost this training rate to that required if a hot war started, far less than the 10 hours demanded by JCS, and MATS could maintain this rate for at best 30 days. Their own Korean war experience tends to corroborate this finding. Asked for a 10-hours-per-aircraft-per-day operating rate MATS, in the initial and crucial stages of the war, was able to boost its 2.8 hour pre-war level to only slightly over four hours.

Thus, they are being asked to do what some of the best brains in the country say can't be done. In spite of this, MATS maintains it has the capability the JCS says it should, but, added one officer (in reference to oft-quoted ex-Army chief of staff Maxwell Taylor's demand for more troop airlift), "We don't have the capability to move everything everyone wants us to move."

MATS' supply backlog, one mark of efficiency, in any given airport is running less than the three day maximum currently acceptable to MATS headquarters. They're thinking of revising that goal to one day. And, in response

to the Capitol Hill charge that MATS is running scheduled flights overseas along the same routes as commercial carriers, one officer snorted, "A schedule is nothing more than a program any good manager uses to see if he can do what he says he wants to do. As for the routes, although we don't use the same bases, there's usually only one efficient, economical way to cross an ocean. We use the same route as the airlines for the same reason."

Beyond its realistic readiness training and the supplemental CRAF program, MATS, in its role as single manager for military air transport, buys a large chunk of commercial airlift. Among the reasons: military air transport demands are higher than the by-product—airlift—of MATS' training program can handle; MATS wants only to be able to do its assigned war mission, wants a strong civil air fleet ready to back it up after the first few days or weeks of an all-out war.

Of the \$200 million paid by Defense to civil carriers for contract, charter and common carriage airlift in FY '59, MATS signed the tab for over half (\$105 million). Of that quantity, \$70.8 million was Congress-appropriated money spent backing up MATS' own peacetime operation. The rest it spent as procurement officer for Logair, Quicktrans and the Air Force Ballistic Missile Division.

Even if the requirement for airlift does not increase (and it's likely to), MATS will soon be spending more of Defense's airlift dollar as it phases in Northeastern North America inter-theater airlift overseas, eventually will be responsible for the whole \$200 million. All procurements are advertised, all carriers are eligible to bid. Commented one procurement officer, "We don't care, initially, what capability they have."

When the contract is let, however, MATS keeps two things in mind:

1—Placing as much business as possible on a fixed, long term basis (to get better pricing, make contract administration easier for both the carrier and MATS).

2—The report of MATS' Capability Survey Committee which visits carriers' facilities, verifies that they can produce as they say they will. "We want to make awards only to responsible and capable carriers. To a good many commanders buying airlift, performance is a lot more important than cost."

But, if MATS has as good a case as any other military organization for existing, that \$70.8 million, and growing, prize has been too much for the commercial airlines to view with clear-cut business acumen. Strangest twist, to MATS officers, in the whole Capitol Hill cacophony is that the very people in Washington who should be helping MATS sell increased use of airlift are, instead, pounding MATS with every brickbat they own.

Like a recalcitrant bulldog, the commercial airlines, through their powerful association lobbyists, are leaning hard on Congress to get them a bigger share of the large MATS Business—in spite of MATS boss Lt. Gen. William H. Tunner's statement that "there just is no more business—unless MATS flies its aircraft empty."

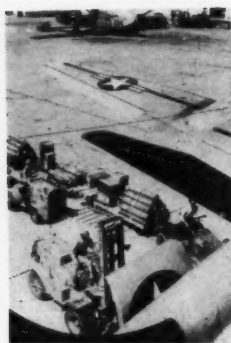
And if MATS flies empty? Ignoring for the moment its crippling effect on MATS preparedness, the cost of Defense airlift to the U.S. taxpayer would skyrocket to nearly \$1 billion—something the Pentagon thinks he would take a rather dim view of. Even though MATS used 80% of its passenger, 74.8% of its cargo capacity during the last fiscal year, commercial airlines still hauled 40% of MATS' passengers, 10% of its cargo.

This is a far cry from MATS commercial augmentation in 1955 when it spent only \$4.5 million on civil airlines

ARMED FORCES MANAGEMENT



Air Mapping and Charts



Cargo



Aero Evacuation



Air Rescue Service

to haul 1.5% of its passengers, 6.6% of its cargo/mail. In the past five years, MATS has reduced its airfleet by 107 planes, cut its personnel strength some 2400 persons. Yet, charges of MATS' persistent expansion, to the detriment of commercial airlines, persist.

False charges are not MATS' only headache. Attracted by the mushrooming market, MATS' bidders list has jumped from 41 carriers in 1957 to 86 this year, is expected to reach 122 in 1960. Most of the additions are briefcase operators with one or two obsolete aircraft, at most, purchased solely to get MATS business.

Operating under a part 45 certification (called "one of the great rackets in the aviation industry" by Oklahoma's Sen. Mike Monroney) and not subject to Civil Aeronautics Board control, these tissue paper firms come under the benevolent protection of a Small Business Administration umbrella—and most of the unreliable outfits spotted by the Contract Survey Committee are in this category.

Said one procurement officer, "These small business set asides are encouraging the use of old aircraft, discouraging the forward looking companies—and, on top of all that, we figure we pay about a 10% premium to give them business."

These quick-hit-and-die operators have prompted an intramural fight among the carriers. But, as reflected in a Congress trying to keep everybody happy, the fight has become something far more ominous. Said South Carolina's Senator Thurmond, "Excessive (governmental) concern with commercial aviation has caused us to progressively nibble away at the Military Air Transport Service."

MATS' request for 10 C-jets (estimated cost: \$53 million) hit a blank wall first time around—for precisely the same reason MATS has been

in trouble all summer; national defense mission keeps being obscured by politics and considerations of false economy.

To MATS the argument for C-Jets seems pretty clear cut. Says Tunner, "We need both a race horse and a work horse." They are getting the work horse, the C-133. For the other: "It doesn't make much sense to us to try to support a 600-knot-an-hour bomber with a 190-knot transport. We're trying to support a rocket (SAC) with a kiddie car."

Adds Tunner, "The transport plane now in the inventory, being piston-driven, would be many hours distant from the friendly base with needed materiel and personnel at the time the SAC bomber arrived. It is precisely the difference in speed between a jet-propelled plane and a piston-driven plane. The SAC plane would therefore be threatened with immobilization after one strike at a target."

And there's the advantage of economy. Ten C-jets will do the same job as 42 of the C-124's which comprise the bulk of today's strategic transport fleet, are nearly obsolete and costly to maintain.

MATS has already heard, in the wings, the yells of the civil airlines. "What they tell us basically," said one MATS officer, "is they want us to do a good job—but not too good." Tunner insists that MATS is not fighting the commercial airlines: "We need them. We are counting on a strong airline industry to backstop us in time of war." But if MATS is not in a fight, it is showing a lot of unexplainable bruises.

What rankles MATS men most, and some of the most knowledgeable men in the airlift business today are in Tunner's organization is that the MATS record is about 180 degrees opposite from the picture painted of it by commercial interests; is, in fact, far better than the so-far performance in war situations of private carriers de-

manding they be given more of the job to do.

Among the quotable:

On claims industry could do the job cheaper: "Assuming the same operational training level, if we split the cargo-passenger business equally with the civil carriers, Defense airlift bill would jump another \$300 million. If we flew empty, the taxpayers would shell out \$750 million more."

Could do it better?: "Ten times during July, August and September last year MATS went looking for commercial airlift augmentation, couldn't find it. During the Lebanon and Far East crisis, all bids in some offerings were so high they all had to be rejected. We had to haul the supplies and people ourselves working overtime. It was the tourist season, if you'll recall. During one week last November when they were on strike, all but four TWA scheduled flights were handled by MATS. We do not consider this the proper way to maintain military readiness."

MATS' "competitive" setup is preventing civil carriers from developing a cargo capability: "They want us to give them the money to build the aircraft, then guarantee them a profit on the business. The airlines built an incomparably efficient passenger service under a free enterprise system. Passenger business in this country is a drop in the bucket, compared to the commercial cargo they could haul. Why don't they go out and develop it instead of going to Washington looking for a Defense department dole?"

What about Congress?: "If they buy this civil carrier idea to pare down MATS even more, they'll be behind the biggest 8-ball they've ever seen. We already have letters indicating every transport outfit in the country, steamship lines, railroads, busses, will jump on the bandwagon—and you couldn't blame them."

A Memo On Mismanagement

To: Armed Forces Management

From: Leland B. Kuhre, Director

Academy of Organizational Science

YOUR May (1959) issue reads to me like the bewildered confessional of an old craft admitting its shortcomings under the pressure of advancing new systems all around it. The articles on the mis-management of time in the Army, the Navy's big reorganization debate, and the random flow of information in a Naval Ordnance Test Station—all tell the same story.

The ominous part is that such confessions continue to appear, unabashed, as they have appeared since the military was overtaken by the swift onrush of science, technology, and specialization after World War I. And the insidious thing is the fault-free attitude with which the confessions are made; they appear to have no chargeable responsibility because they are tacitly agreed to be "the nature of the beast."

Starting about the mid-nineteenth century, craft has been steadily overtaken by system in all dynamic structures for using material energy. But, in collective human energy, the military is still using accumulated lore and the master-apprentice method of learning where the head of any collective is, ex-officio, an acknowledged master craftsman. He often calls his maxims and proverbs "principles" even though each has its opposite; he calls his management "scientific" when the term is really limited to material-system accessories; and he calls his collectives "organizations" even though they do not contain the organic system which is implicit in the word.

The craft method for devising internal arrangements in a human effort collective has its earliest recorded model in Plato's 400 B.C. model, "one man writ large;" and this is still the craft model today in different words, such as, "it's all a matter of leadership" and "there are no bad companies, only bad company commanders."

Leadership has always been the military starting point for internal arrangement in a collective of people. Leadership is a personal, and therefore, an unknowable and unpredictable thing. Its metaphorical referent acts are four: the whip, the carrot on a stick, personal magnetism, and the palliative. Leadership builds a network of personal tensions that is the so-called structure of the collective.

The network's stability is of the moment, and it has existence only in the minds of the people caught in it. As new functions evolve, they attach themselves at points in the network by evolution, by force of circumstance, or

by personal attraction. The so-called organization chart is formed with the rudimentary graphics of the craftsman, and it is limited to formalizing the authority of people over people. The chart cannot possibly, in its present stage, show how a network of personal tensions is supposed to work.

To try to systematize and control the flow of ideas in a network of personal tensions, and thereby really do something about the Army's self-confessed mis-management of ideas—to do this has less chance of success than trying to systematize the flow of invisible electrons for a purpose in a spider's web.

Before internal-arrangement craftsmanship in collective human effort can become organizational engineering, and thus advance the military from dealing with the "nature of the beast" to dealing with system, we need a more solid starting point than leadership. We have to change the assumed relation of the force of personality to the force of impersonal ideas. We have to recognize the flow of ideas as the flow of energy which develops organizational power. Then, from a governing law of idea flow, the organizational engineer can design a stable dynamic structure as a purposive systematic whole; and ideas can be formed, dispatched, and transmitted to the point of application for developing needed organizational power.

In such a dynamic system, personality and personal relations become subordinate to impersonal ideas and are adjusted to them. The source of power in the system is, of course, the fully contributing, free mind of each and every individual—executive and administrative, managerial and supervisory, generalist and specialist, professional and scientific, clerical and artisan.

Shall we change a 4,000 years-of-record unbroken tradition of leadership as the thing about which the military revolves, and from which it is supposed to draw its power? Yes, a fundamental change, when man is capable of handling it, is a prerequisite for vitalizing a tired past into a fresh future; and we need, obviously, a burgeoning future progress to overtake the 50 year head start that technology already has over craftsmanship.

Let's answer that question with questions: Can we afford to continue with craftsmanship when the best it has done to date is to bring us to an almost 2 to 1 disadvantage with Russia in the time it takes for an idea to grow to actuality in research and development? If that isn't enough reason, can we afford the man-hours and the money it takes to indulge in the periodic and sweeping reorganizations that take place every two or three years in the Department of Defense, the Army, the Navy, and the Air Force? And if that still isn't enough, think of the loss due to the inefficient use of manpower, money and material that must go on for a long time before a situation gets so bad that only a drastic, sweeping, and expensive reorganization can palliate it, and then only for a few years.

The choice is clear: Continue with "leadership" and we continue with craft lore, craftsmanship, master-apprentice learning, and the kind of structures we get when a craftsman is trying to build something he can't visualize. On the other hand, start with ideas as governing and we can have systematized knowledge, organizational engineering, applied-theory learning, and the kind of structures we get when the engineer designs the skyscraper that the master craftsman could not even visualize, much less build.

Inconceivable? No, I speak from experience. While in the Army I tried the change from leadership to idea flow as governing, and, with the help and participation of thousands of people, worked out the organizational engineering in the proving ground of actual organizations. For 13 years, the predicted results came true, time after time. It can be done.

DYNA-SOAR



Dyna-Soar (for dynamic soaring) is a joint project between the Air Force and the NASA, and is an attempt to solve the technical problems of manned flight in the sub-orbital regions. Advance knowledge on the project indicates how a boost-glide vehicle can operate from the outer fringes of the atmosphere where it can maneuver and be recovered undamaged. Studies show that by varying the original rocket boost,

and thus the velocity, and with the control available to the pilot, the Dyna-Soar aircraft can circumnavigate the earth, followed by a normal and controlled landing. Boeing Airplane Company, one of the competing companies for the development contract for the complete boost-glide system, has delegated to RCA the responsibility for the development of important electronic components of Dyna-Soar.



TMK(s) ©

RADIO CORPORATION of AMERICA

DEFENSE ELECTRONIC PRODUCTS

CAMDEN, N. J.

For more facts request No. 107 on reply card.

Researching Success In the Military Market

Continued company success in the military, market requires formal research efforts expended on new products, techniques and systems. There's a double reward . . .

by Dr. Bernard Litman
Asst. Chief Engineer for Research
Arma Div., American Bosch Arma Corp.



MOST of today's large contractors who do work for the Armed services have participated in both development and production contracts. In order to assure their continued success in this difficult and increasingly competitive field, they must offer the customer something of distinct value.

No longer does it suffice to pick up incidental improvements obtained in a development program for a specific piece of hardware and attempt to incorporate these in new proposed work for the government. Nor is there any great value in large technicolor proposals, in pleading to your congressman or in daily prayer (although the latter will bring inspiration and the realization that God helps those who help themselves).

It becomes more evident as time goes on, that continued success requires formal research efforts expended on new products, techniques and systems. The success that can come from such a conscious and carefully followed program not only fulfills the needs of the Armed forces (and hence of the entire nation), but also enhances the company's prospects in associated commercial work.

What are the problems and risks involved in undertaking such a program? What reception will it meet from the various armed services? We can discuss this in terms of three general areas: (1) Initial planning or deciding what to work on; (2) Control and monitoring and (3) Financing and exploiting.

Since a large amount of time, effort and money is involved, careful consideration must be given to the areas

to be covered by the research program. "What do you want to work on" must be asked, not only of the technical people but also of the corporate planning people. The answer will fall into two general categories.

The first represents old specialties of the company. Here there are known strengths and a known position in the field, and improvements are sought to enhance the company's position in the future. A careful review, however, may show that some of these areas no longer represent useful needs to the customer. (The Army will no longer buy horseshoes no matter how ingenious the design or how low the price.)

The Delicate Balance

In addition, some competitors may have risen so rapidly in their accomplishments that it is not profitable to continue in a given area. A delicate balance must be struck between a defeatist attitude and the expenditure of money on a lost cause.

The second category will cover items new to the company which permit future product diversification. Direct competition with old-timers in the fields is difficult and new approaches must be sought which, if successful, will give an unusual capability. It is sometimes also possible to lean on established products within the company in order to support the new products in a combined system which uses both. How does one decide which new product developments to embark upon? In many cases the choice will be influenced by the known skills of people within the organization. This does not mean that we will do research in field

A just because Mr. B is an expert in this field. However, if Mr. B can suggest a few useful improvement ideas in field A that are worthy of study, and the competition in field A is not overwhelming and the military have a recognized need for improvements in this field, it becomes very logical to embark on a research program in this area.

A moderate amount of research should also be set aside for radical new concepts and techniques with the full realization that the great majority of this effort will be unsuccessful. A conservative company will not go so far as to include anti-gravity or perpetual motion studies. Nevertheless, some of the studies should have a "blue sky" approach and strike the stockholders as a waste of their money.

When properly directed, these efforts are not only stimulating to the other research efforts but occasionally will produce an idea worthy of further study. If hints of these items can be put into the "intelligence" columns of the trade journals, the attendant publicity and the uneasiness on the part of competitors is alone worth much of the money expended.

So far, we have discussed research work which is devoted largely to development of new hardware. Another class of interests will involve systems studies and concepts. These will adopt both old and new hardware to complex integrated systems and will help determine the necessary performance characteristics of the desired hardware. There will then be interplay between these studies and the hardware research and this interplay should be

planned for as carefully as any other activities.

Once the research effort has been spelled out, it should be presented for general review at a high corporate level. Since it conforms to the most likely future business activities of the company and since its prosecution involves expenditure of company funds, it is important that the corporate planning people know what is going on and are in general agreement with it.

The entire effort should then be worked up into a detailed plan. This should list expected delivered items (finished equipment, research reports, breadboards, etc.); and dates for delivery of these items, as well as intermediate dates which may serve as useful landmarks for completion of portions of the effort.

The plan must also include a personnel chart with the names of specific people available for each task and the duration of their availability. Separate budgets of man hours and materials for each task must also be set up. Finally, there must be a "customer" who is independent of the research department and who, if not kept happy, has the right to cancel all or part of the program. This customer would most logically be the corporate planning group that reviews and approves the original program.

Upon first viewing the requirement for these controls, the creative researchers are likely to rear up and claim that they can do no effective work in such an environment. Research is imaginative, creative, uncontrollable and nebulous and they cannot invent things on schedule just to suit the financial planners of the corporation. At this point, an effective selling job on the true value of these controls is very important. Fortunately, a selling job based on logic is not difficult since the controls are of value.

The most stimulating environment and best results for research have come when there were firm goals and written commitments. This can be reviewed with the research personnel and specific instances elicited from their experience. This does not mean that research goals are regularly met, for research is, indeed, a nebulous affair. What it does mean is that there is conscious striving to meet the goal and, when unsuccessful, a review of reasons for missing it which may help redirect future efforts.

The research personnel who are going to do all the actual work shall also participate in setting up the details of their controls. When asked what they can accomplish and by what date, they will generally offer more than is expected, rather than less. A sign of their enthusiasm—when they see the value of the controls—it may, in fact, be

necessary to temper their estimates with some realism before publishing the commitments.

While we dwell on the subject of selling the research program, it is worth noting that the program should also be presented as widely as possible through the company. It will generate surprising interest and everyone will tend to view it as the source of the company's future success. In addition to the general morale value, there will be practical benefits when the help of other sections of the company is needed to prosecute the work of the research department.

Once goals and commitments have been established, a regular comparison (perhaps monthly) is required of actual vs. predicted performance. This can be done without excessive paper work. Where failures have occurred, there should be valid reasons cited. This picture should be presented to the corporate "customer" and it must be made to sound as reasonable to him as it does to the people within the research department. The "customer" is similarly anxious about the success of the program and will not complain about its progress for capricious reasons.

Financing

The contractor whose major business is military in nature has a special set of financial problems when he wishes to embark on a program such as we have outlined. He does not have a major source of commercial enterprises from which he can draw profits to support his work. He will ask to what extent might the government approve these costs as allowable overhead expense items so that they can be partially absorbed into the cost of doing business on other military efforts. Surprisingly, the military services will be receptive to this. It should not be viewed as an underhanded maneuver. The military attitude is not pure altruism but rather represents enlightened self interest. They realize that the fruits of these research efforts are directly applicable to new military equipment and that if this work does not get some financial support it probably will not be done.

The controller and legal department, at this stage, must seek appropriate understandings and corresponding wording in all possible military contracts to accept the basic company research program as one of the allowable overhead items. This is generally obtainable with the proviso that each major item on the research program first be reviewed and approved by one of the military's research agencies. This review will consider whether the efforts are truly research and whether they

are of probable value to the military. Brief written summaries will have to be provided on both the technical and financial content of these research efforts.

What other means are available for financial coverage? It is always possible to sell a specific study or development to one of the military agencies as a directly funded project. These agencies are frequently looking for items to fund which may be closely allied to their areas of interest. Therefore, after items on the research program have been developed to the point where they can be well defined and success seems probable rather than just possible, an attempt should be made to sell further work to some interested agency.

Why Funded Projects

Such a funded project has several advantages. The overhead rate is not burdened by the project, so that other work which one attempts to sell to the government will be more attractively priced. The existence of a funded contract represents some recognition of the project and it becomes much easier to advertise it elsewhere, represent it as an item close to practical realization, and seek possible applications for it.

The next logical step: remove the item from the research program and convert it into a production item. While there is no magic formula for doing this, continued exploration of possible uses with the armed services will ultimately uncover a useful area so that direct funding and ultimate production will result.

There will, of course, be some areas of research which are not fundable by either of the above methods and will be paid for out of corporate profits. There should be no less enthusiasm for these efforts since presumably they have been selected as research efforts of value to the company. In fact, extra attention to these areas may result in more rapid conversion to a production application and change from a loss item to a direct profit contributor.

The existence of this coordinated research program will prove to be of value for more than just internal operations. The existence of such a planned program represents a forward thinking attitude and should be mentioned in proposals, verbal presentations, releases to the public, etc. This demonstrates most effectively that your research efforts are not just lip service but represent a planned and aggressive effort from which much can be expected. The company's prestige and status in the eyes of others will improve and thus indirectly the opportunity for future business is enhanced.

What Makes Good Pilots?

The following questions were sent to both BuAer and the Aeronautical Training Society. We believe the answers here give both sides of an old argument fully and fairly.

1—The late-1955 Heller report, result of a \$40,000 Navy-sponsored study by a private firm, said Navy could save nearly \$7-million a year by contracting for primary flight training rather than doing the teaching itself at Pensacola. Was this accurate then, and does it still hold true?

2—Although Navy did not adopt the major recommendation of the report, it said the expense was justified through improved management practices and resulting economies. Can you cite some of these?

3—Air Force contends the contractor system, which Army also uses, produces better pilots. Navy says their system does. Is there any way of settling this argument, particularly in peacetime?

4—ATS claims the low turnover rate of instructors at contract schools means better teachers than military men "frequently replaced at the end of one year." Can the Navy disprove this?

5—ATS says absence of "extra-curricular" military duties plus greater job specialization mean manpower needs are cut. Can't the Navy change the jobs of military instructors to accomplish the same ends?

6—ATS says contract school system broadens the base of the Nation's military strength. Is this true? If not, why not?

7—Why can't a satisfactory military atmosphere be maintained at contract schools?

8—Heller says it would probably take five years to develop a "reasonably satisfactory" Navy contract school system. Even assuming it would want to adopt the idea, can Navy afford that step backwards?

9—Adopting the idea would involve, says Heller, moving Navy training out of Pensacola. Is this justifiable? Or advisable? Is it advisable, contract school or not, as the Heller report implies?

10—In this hassle, the Navy has been accused of letting tradition dictate to intelligence. What would be your answer?

The Navy Viewpoint

1—No. The figure was not accurate then, nor is it so today.

2—The Heller Report has served a useful purpose in the area of management practices and has more than paid for itself in resulting economies. Significant economies have cut the original cost differential between military and contract flight training about 50% by:

(a) Moving primary flight training from NAAS Whiting to NAAS Saufley.

(b) Changing personnel rotation policies.

(c) Elimination excessive flight time permitted students to complete the primary phase.

(d) Improved methods of scheduling and maintaining aircraft.

(e) Improved use of military and civilian personnel.

Continuing effort and cost analysis are being made throughout flight training to effect economies without reducing quality.

3—No.

4—The tour of duty for military personnel assigned as flight instructors for primary flight training has been in-

The ATS Position

1—The figure quoted in the Navy-sponsored study by Robert Heller & Associates, of possible savings of \$6,924,000 yearly was as accurate as possible. Since the Heller study, the Navy has changed its program considerably, so it is doubtful the exact figure would apply today.

2—We agree that the Heller Report served a useful purpose—but not in the way Navy says. The study brought widespread attention to specific advantages of contract training. The Navy's failure to adopt major recommendations of the report it sponsored—that is, to undertake contract training in the primary stage—would indicate that Navy did not attain the fullest benefit possible. On the other hand, the Navy did make changes, many of which appeared to cover up the more obvious deficiencies of their system as against contract training.

3—Heller & Associates were retained by the Navy to compare the Navy system of primary training with the Air Force system. The Heller report concluded that students at contract schools are more enthusiastic than Navy students over the advantages of the service as a career. Also, it stated: "On

ARMED FORCES MANAGEMENT

creased to thirty-three months.

5—No. The organizational complexities of the military system preclude the simplified management approach available to the civilian contractor.

6—No. A large majority of the civilian instructors are ex-military officers fliers who are subject to recall in the event of mobilization, with the result that the ability of the contract system to expand during a national emergency would be curtailed significantly.

7—Civilian contract flight instructors are not dedicated to the military way of life. The Navy feels that its student aviators should be instilled in a proper naval atmosphere as early as possible, in keeping with Navy philosophy that a naval aviator is first a naval officer and secondly a pilot.

8—It is questionable that it would take the Navy five years to establish a reasonably satisfactory primary contract school operation, particularly if advantage were taken of the Air Force experience and know-how gained over the past eight years. Therefore, the Navy would not be taking so much of a "step backwards" from the standpoint of time required for implementation as it would in terms of flexibility.

balance, it seems clear that contract instructors generally are more proficient technically and better qualified than their Navy counterparts."

4—The contract schools' great advantage is the fact that instructors are on permanent jobs with minimum turnover. This is reflected in the Heller Report which notes "generally, instructors at the contract schools visited are older, more mature, better satisfied with their assignments, and more proficient in the art of communicating their knowledge to students than are the instructors at Whiting Field." In the service, many feel that the training duty tour is dull and routine as against other flying assignments.

5—The manpower saving of contract training affords the Air Force and Army great economy in primary training. USAF once compared operation of a military-operated primary training school with a contract school. The military staff comprised some 2100 officers and airmen, while the contract school could accomplish the same mission with about 700 personnel. This emphasizes how manpower needs and costs are cut by contract training.

6—Contract schools do broaden the base of our overall military strength, according to the Heller Report, by providing "a way to use effectively

The Navy considers that its training activities must be responsive to its needs, and that the rigidity inherent in a contract type of operation would be costly and detrimental to Navy training objectives.

Drastic adjustment to the present Navy basic (the phase after primary) syllabus would be needed due to the difference between the lengths of the Navy primary flight syllabus (38 hours) and the contract primary flight syllabus (130-140 hours). The military aspects of basic flight training such as formation flying, gunnery, field carrier landings, carrier landings and so on would have to be removed and inserted later in the course. This is not simply a matter of switching the syllabus, because the earlier in the course such items are introduced, the less expensive they are.

9—The Heller Report indicated that none of the existent Navy training bases in the Pensacola complex would be suitable for contract operation. Therefore, adoption of the contract concept would in effect move Navy training out of Pensacola, and that well established complex would be reduced primarily to an administrative role with the flying activity dispersed. Present construction in the Pensacola

men who could not instruct if they were in uniform and thus to release combat-qualified pilots to billets where there mobilization readiness could be maintained and improved." Most contract school flight instructors are disqualified either by age or ability for combat flying. Yet they are a reserve of trained flight instructors accomplishing a vital mission for the military services.

7—There is a satisfactory military atmosphere at all contract schools. Military indoctrination, as in the Navy, is the responsibility of the service. USAF contract schools are each commanded by a small military staff which provides just the right amount of "military-way-of-life."

8—The Navy could establish contract training in a matter of months, accomplishing such instruction more efficiently and economically than it ever has before. It would be just a matter of deciding to do it. The Navy primary flight syllabus of 38 hours does not include the more advanced-type flight training given in the Air Force primary course of 130-140 hours. In other words, the Navy in reducing what it calls primary training to 38 hours has tried to make it appear that teaching a Navy man to fly an airplane is in no way similar to teaching an Air Force man to fly.

complex will provide adequate facilities for anticipated requirements, including basic jet training, and as the new facilities become available, obsolete bases will be phased out.

Adoption of contract flight training would negate the planned usage of these facilities, with the result that most of them would have to be closed at considerable expense. Contract school or not, the Navy has a considerable investment in the Pensacola area, and it would be most uneconomical to move Navy training elsewhere.

10—There is no question that tradition plays an important role and guiding influence in creating *esprit de corps*, loyalty, courage and leadership in the Navy. Our Navy has a tradition of which it can justly be proud. However, the Navy is not so tradition-blind that it can't adjust to changing conditions.

The primary objective of our flight training course is to train young men to be naval officers who can fly. It is relatively easy to teach a lad to fly. But to make an officer out of him, particularly a Naval Officer, is something else again. We believe our system does these things better than a contract flight training system could possibly do.

9—The Heller Report recommended that "primary pilot training in the Pensacola Complex should be discontinued," adding that the facilities either be closed down or made available for other duty. We feel that there is a need to reevaluate the existing Navy training bases in the Pensacola complex. If none is suitable for a contract operation, consideration should be given to establishing separate contract schools or integrating Navy primary training with that of the Air Force.

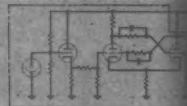
10—We've always felt the Navy has used "tradition," if that's the right word, as a poor excuse in its criticism of contract training. The Navy emphasizes a need for "a proper Naval atmosphere"; that "it takes a Navy pilot to train a Navy pilot"; and the Navy philosophy that "a Naval aviator is first a Naval officer and second a pilot." The Navy tradition is great and respected. Yet the Navy in using such statements regarding contract flight training seems to belittle the need for superior flight training at this initial stage. It tends to look upon the primary flight training phase as a course for officer training, leadership and so on. We know these are necessities, but the actual flight instruction (and cost) should be kept in mind.

CAPABILITIES FOR DEFENSE



THESE THREE LIGHT SENSING SYSTEMS PERFORM EXACTLY THE SAME FUNCTION

	SIZE	WEIGHT	INPUT POWER	COMPONENTS	SOLDERED CONNECTIONS
VACUUM TUBE	4 cu. in.	26 grams	5 watts	16	18
TRANSISTORIZED	1 cu. in.	7 grams	0.75 watts	14	15
MOLECULAR SYSTEM	0.001 cu. in.	0.02 grams	0.06 watts	1	2



Westinghouse laboratory produces molecular electronic systems 1/1000th of present size

Molecular electronics—a technological breakthrough at Westinghouse—is producing electronic systems 1,000 times smaller and lighter than anything now in existence.

Recently, the Air Research and Development Command of the U. S. Air Force awarded a development contract to Westinghouse as a part of a broad program effort in this new electronic area. Experimental "hardware" is being fabricated by Westinghouse for infrared, reconnaissance, communications, telemetry, flight control and other military applications for the Air Force.

For some time, the Solid State Advanced Development Laboratory of the Semiconductor Division, located at the Baltimore defense divisions, has been producing for special equipment applications a single material which accomplishes all the functions normally performed by several components in a conventional assembly.

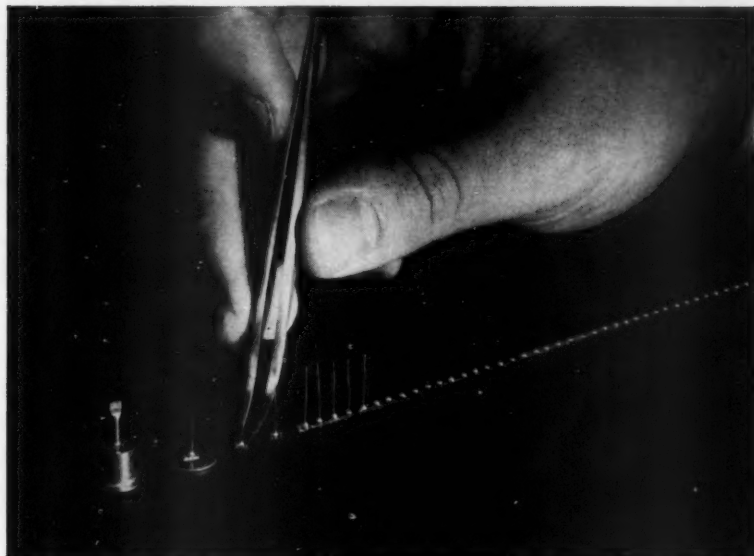
Pictured above at right, a single wafer—less than 1/2" in diameter and about 1/100th of an inch thick—performs all the functions of much larger conventional and transistorized light modulated oscillators

shown at left and center. This tiny complete functional system, a light sensing device for satellite telemetry, is one of several including pulse generators, multiple switches and similar subsystems built and demonstrated by Westinghouse.

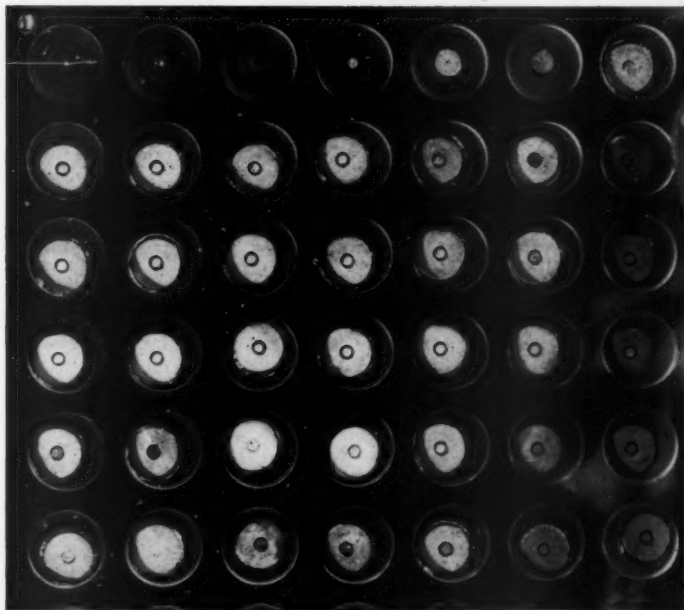
Through molecular electronics, drastic reduction in weight, size, power, and heat dissipation requirements will permit space vehicles and satellites to perform a greater number and wider range of tasks. Greatest advantage is vastly improved reliability achieved by the replacement of numerous components by a single solid state unit.

Westinghouse arrangement of component laboratory side by side with systems manufacturing divisions—unusual in industry—is providing a steady flow of information between component and systems scientists and engineers. A coordinated program involves the Air Arm Division, the Semiconductor Division, the Materials Engineering Department and the Research Laboratories. At all of these locations, continuing research is determining greater uses for this new approach to the building of better, more efficient electronic systems.

HIGH-SPEED
been achieved
a mirror-finish
Method of
and polished
mally large



AUTOMATIC PRODUCTION of diodes at high speed and with great reliability may be possible as a result of molecular electronics. Shown above, individual diodes are sliced from ribbon following electrical connections. Each crystal in photo below is a self-contained subsystem, performing all the functions of a component-assembled unit. Row at top shows varying sizes to almost the vanishing point.



Westinghouse

DEFENSE PRODUCTS

1000 CONNECTICUT AVENUE, N.W., WASHINGTON 6, D.C.

AIR ARM DIVISION
AVIATION GAS TURBINE DIVISION
ELECTRONICS DIVISION
AIRCRAFT EQUIPMENT DEPARTMENT
ORDNANCE DEPARTMENT
WASP

YOU CAN BE SURE... IF it's Westinghouse

For more facts request No. 108 on reply card.



HIGH-SPEED GROWTH of semiconductor crystals has been achieved by Westinghouse. Crystals are formed as a mirror-finish ribbon of required width and thickness. Method eliminates costly and time-consuming sawing and polishing of germanium ingots, drastically cuts normally large loss of original material.

What Team Management Means To the Ballistic Missile Division

Called the "most accurate, fully detailed account of our management system ever written," this exclusive report tells how Air Force managers control the ballistic missile program, outlines why the system is "the adhesive that binds the team together."

OVERWHELMING in its scope, the ballistic missile program has already cost billions of dollars and many more billions will be spent on ballistic missiles and space vehicles in the immediate future. Today, over 90,000 civilian and military personnel are engaged full-time in the Air Force's program alone—twenty-five major associate contractors—hundreds of subcontractors—and thousands of vendors and third tier contractors are busily occupied producing the myriad of "nuts and bolts" that go into a ballistic missile.

Beyond being expensive in money, industrial and military resources, the ballistic missile program is costly in terms of manpower. Some of the outstanding scientists and engineers in the world are devoting their full time towards advancing this program.

Actually, it is a joint industrial/scientific/military effort of the greatest magnitude to develop a second-to-none ballistic missile weapon capability as rapidly as technology will permit. Obviously, this requires teamwork and this is precisely how the Air Force ballistic missile program is managed—on a teamwork basis.

The Team

The Air Force Ballistic Missile Division, Headquarters, Air Research and Development Command (AFBMD) is "captain" of the industrial/scientific/military team, manages a program which includes: the Atlas, Titan, and Minuteman intercontinental ballistic missiles; the Thor intermediate range ballistic missile; and numerous space projects and military space systems. The management team, physically integrated into one installation in Ingle-

wood, California, consists of three other principal organizations:

1—The *Ballistic Missile Center*, Headquarters, Air Materiel Command (BMC) is team member for production, procurement, logistics management, and contract administration.

2—*Space Technology Laboratories* (STL), a civilian contractor composed of outstanding scientists and engineers, is team member for technical direction and systems engineering.

3—SAC MIKE, phonetic designation for the Headquarters, Strategic Air Command team member, is responsible for operational planning, training, and integration of the weapon system into the Air Force's arsenal.

Inglewood is essentially a management organization. The personnel are not over drawing boards; not producing hardware. They are performing a management function. The Inglewood team is responsible for the technical coordination of the contractors, and responsible to evaluate both the technical and managerial progress.

"Our management control system is the adhesive that binds the team together." So said Lt. Gen. Bernard A. Schriever, until recently Commander of the Air Force Ballistic Missile Division (Hq. ARDC), and now Commander of the entire Air Research and Development Command.

All personnel work under the team concept of management which is nothing more than the considerate, cooperative, and coordinated efforts of all people toward a common goal. On the surface this would appear to be a

loose arrangement analogous to management by committee. One fundamental difference: the authority assigned to the Air Force Ballistic Missile Division as the team captain.

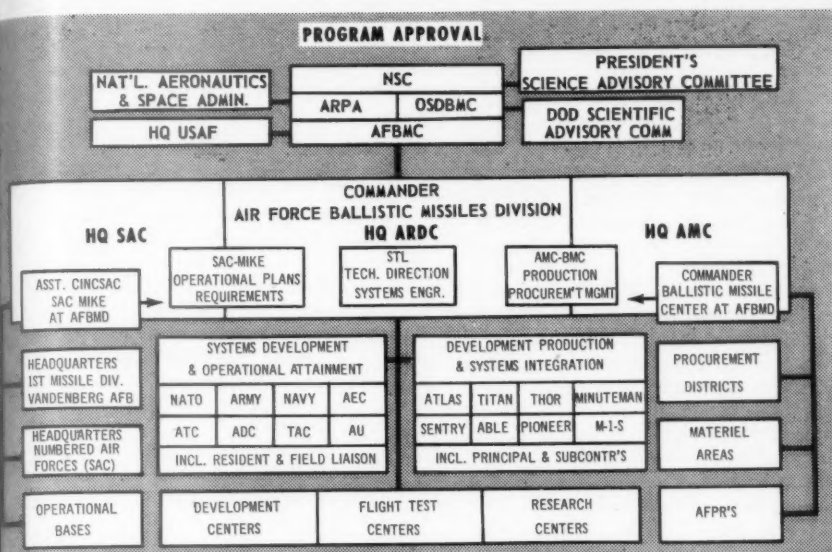
Even so, something more definitive is required if "team management" is not to degenerate into utter confusion. This is the reason for the *management control system* (MCS). As the team integrates the efforts of the contractors, the MCS integrates the efforts of the team. But this is a generality. At Inglewood, the term *total management control* is more appropriate.

At Inglewood headquarters, a definition of management control serves as a mission statement for our MCS. Actually, the definition is the first formal one given to the term back in 1923 by the great French administrator, Henri Fayol. Fayol said:

"... Control is an examination of results. To control is to make sure that all operations, at all times, are carried out in accordance with the plan adopted, the principles laid down, and the orders given. Control compares, discusses, and criticizes. It tends to stimulate planning, simplify and strengthen organization, increase efficiency of command, and facilitate coordination."

The System

As previously stated, the MCS is basically a technique used by top management to obtain a standardized and coordinated approach to planning and programming among the several organizations comprising the Air Force ballistic missile and military space systems management team. More specifically the management system is designed expressly to provide procedures,



lishing general management data processing priorities; Developing data standards and formats for the *Review Center* records and for approved program data documents published from the records; Resolving management team interface problems related to data processing, data publications, standards, and formats; Submitting recommendations or unresolved problems to the *Program Management Policy Committee* for resolution or approval.

Data Reservoir

Another major MCS element: is the central reservoir of data. *Inherent in the team concept of management is the need for all working levels to use the same basic records.* With our four autonomous organizations—with responsibility decentralized to the lowest practical level—and with a large percentage of specialists on the team, the ability to develop records in a standard format acceptable to and usable by all team members becomes a major task. However, if each organization and each project office developed records in whatever form or detail they desired the problem of communications would become nearly impossible.

Yet under decentralized management, essential to our team concept, these same concepts encouraged the dilemma. This is the major reason for the *Program Management Representatives* and the *Management Data Committee*. It is also the reason for a central reservoir of data. *The Program Review Center records from the central reservoir.*

Data Processing

At present about half of the records of the Program Review Center are on machine processed punched cards, and the other half are on full size *Program Review Center* charts. Eventually most of the data in the central reservoir will be processed by a high speed electronic computer. Already begun, this program holds promise to be one of the most advanced management data processing systems in the country.

Essentially, many offices contribute individual elements of program data into the central reservoir, so that it may be consolidated into usable reports.

No one project office has all of the information it needs from sources within its own office. Each depends upon receiving data from other offices, and each receives much more data in return. Jointly written procedures, mutually applicable to the team, establish the coordination and authentication required both to process data into the reservoir and to process it out in the form of reports and data publications.

products, and activities that further the team concept of management.

There are several major elements to the MCS which center around the operation of a Control Room, called a Program Review Center at Ingleswood. Of course, Control Rooms are not unique. In our MCS the Control Room is only one element of the system.

Thus the Control Room becomes the hub of a management wheel, and the spokes are the elements of the management control system. The "*Program Review Center*" is a conference and chart-display room available for the use of all team members. In the *Review Center* or near it all team approved and authenticated program records are maintained, displayed, and published. The *Review Center* is also a real reminder and symbol of the MCS.

Second of our several MCS elements is the *Program Management Policy Committee*. This is the senior team of the ballistic missile and space systems management installation. Chairman is Major Gen. O. J. Ritland, Commander of AFBMD; the Ballistic Missiles Center member is Major Gen. Ben I. Funk; the Space Technology Laboratories member, Dr. Louis G. Dunn; and the Strategic Air Command member is Colonel John Proctor. The Committee approves all policy and general procedures, approves all recommendations, documents, or procedures related to the team concept of management.

Third major element of the MCS is the group of individuals called *Program Management Representatives*. In each major organization of the management team, in each weapon system project office and in each major staff organization of the Air Force Ballistic

Missile Division, there is a *Program Management Representative*.

These individuals represent their staff or organization on matters concerning the MCS as well as other related management and administrative functions. The entire concept of our weapon system management as well as the MCS is based upon decentralized responsibility. The everyday management of the program emanates from the many joint project offices. The *Program Management Representatives* form the link between the responsible decentralized management offices and those parts of the MCS that, by necessity, are centralized—such as the joint *Program Review Center* and its official program records, the special central staffs concerned with overall planning, programming, and budget matters.

Data Committee

The *Program Management Representatives* of each of the major team members—STL, BMC, SAC MIKE, and AFBMD, form a committee called the *Management Data Committee*. It is a working group (as opposed to a broad guidance body such as the Policy Committee described above).

The work of this group represents the essence of team management in action. The responsibilities of this Committee are similar to those of the individual Representatives, but of a broader scope. Instead of representing a particular staff or organization, the group considers subjects of mutual application to all team members.

The Committee handles:

Determining the joint management data system requirements for the *Program Review Center* records; Estab-

Many Records Needed . . .

Since information plays such a large role in a management organization, a few key MCS records—some of which represent new twists to old ideas:

Milestone Data

A large number of program records are of the "Milestone" type: markers along the road to a destination; a checklist of events that must occur before reaching a goal; specific tasks that must be accomplished before the realization of planned objectives. At the ballistic missile management complex, we attempt to identify a sufficient number of milestones to give management early enough warning of imminent trouble spots so that corrective action may be taken to keep ultimate program objectives from slipping.

If, for example, in our records on propulsion, the only milestone we had was "Deliver the First Rocket Engine" and the time for delivery came and it was not delivered, there would be nothing we could do. In all probability the program would also slip. The milestone is too significant to stand by itself.

An Auxiliary Pump Drive Assembly (APDA) is a major component of our rocket engines. If, in our propulsion milestones, we had "Deliver the First APDA" followed by "Deliver the First Engine" and we slipped delivery of the APDA, then the next milestone would almost certainly slip and we would be in the same managerial difficulty.

On the other hand if, for illustration, we had one hundred intermediate milestones leading up to the delivery of the first APDA, and perhaps, another hundred leading up to the delivery of the first engine and, along our progress, we missed one of these milestones, we might have sufficient warning to take some action to meet our ultimate objectives anyway. More funds, more manpower, overtime, realignment of tasks, use of back-up capabilities in existence, and other such emergency actions might prevent a comparatively minor slip from becoming a major catastrophe. *The key is early warning of trouble.*

We use the milestone records technique in almost all program areas. At one time our staffs had identified nearly nine thousand milestones. This may seem to be a large number, but actually it is comparatively small in terms of the size and scope of the program. Some of our major associ-

ate contractors have this many milestones in their own records for just one part of the program.

In the early days of the program, the milestone data was maintained exclusively on large, hardboard charts in the *Program Review Center*. As the number of milestones and corresponding number of charts became greater, it was obvious that new data processing and presentation tools were required. We took the obvious step. In mid-1956 we began a gradual changeover of the records to machine data processed punched cards.

Today, 90% of the official central reservoir milestone data is on punched cards. Large charts of the milestone type are generally of summary information only. The application of the milestone data to machine data processing, in the form we use, is in itself an interesting and, we believe, new application.

Also interesting and very valuable to management was the introduction of *line responsibility* for each milestone on the machine-printed records. *This system leaves no doubt as to who is responsible for each milestone.* Of course, the sorting capability of machine-processed data provides certain flexibility previously not achievable with charts and includes the capability to obtain a *machine analysis* of milestone activity that otherwise would take many hours.

Hardware Records

By far the most detailed of all records in the central reservoir are the *Hardware Records*. The name suggests the subject: engines, guidance units, nose cones, complete missiles, ground support equipment, and similar "hard" end items. The number of individual reports prepared from the hardware records are far too numerous to list individually, so only two basic families of this type record will be mentioned.

Configuration Records provide management with information that matches the missile airframe with the propulsion unit, guidance set, and nose cone on a serial number basis, also indicates certain key production, delivery, and need dates relative to each of these major subsystems. At the present time, thirty-eight different reports are prepared for the staff from these records.

Unlike an aircraft weapon system, a large percentage of a ballistic missile weapon system, both in cost and hardware, is composed of *ground sup-*

port equipment (GSE). Each missile system has hundreds of pieces of GSE. Again, the technical integration responsibility of the Air Force's management team requires that we have available detailed allocation and delivery schedules for the equipment as well as certain other pertinent data.

Technical manuals are essential both for training and to the "man in overalls" who is responsible for maintenance of equipment. In order that management knows all manual requirements have been identified and will be available when needed, milestone type records have been developed. These are also on punched cards. The Air Force provides the contractor with a complete status report on the Manual program. The contractor only reports status on the exception principle.

Financial Charts

In addition to the detailed accounting records maintained by the Air Force Ballistic Missile Division Comptroller, a special financial management chart is prepared on each major associate contractor. The ballistic missile program management operates on an *incremental funding* basis with its contractors—a "pay-as-you-go" system. There have never been any "blank checks" in the program. Incremental funding requires that management review the funding program more frequently than in some other methods. Otherwise, in a fast-moving program such as ours, it is possible for the contractor to be caught short of funds, and thus be unable to perform.

To assist the project officers in Inglewood, the *Financial Management Charts* were devised some years ago according to the project officer's particular needs as well as to the desires of top management. The charts indicate: How much money has been given to the contractor, in increments; How much money is in process to the contractor; How much he has "spent;" How much is programmed for the year for the contractor's effort; The contractor's projection by month of what he expects to spend. (Sometimes modified by the program officer in light of previous experience and knowledge of forthcoming changes.)

When the contractor's actual invoices and uninvoiced commitments deviate from the projection, there is reason for concern, for these projections have proven very reliable. Figures above the projection could mean an overrun condition; actual figures below the projection can sometimes mean that the contractor is not subcontracting rapidly enough to keep up with program objectives.

ARMED FORCES MANAGEMENT

1	PROGRAM PLAN APPROVED	SEP 57	
2	DEL. 1 ST CAPTIVE TEST MSLE	JAN 58	
3	START STG BTLSF TESTS		
4	FIRST CAPTIVE TST		
5	HOLD A C X TESTS		
6	LAUNCH 1 ST SER. MSLE		
7	LAUNCH 1 ST SUPER N FLT MSLE		
8	START LOT B CAPTIVE TSTS		
9	COMPL TEST STG 4		
10	COMPL TEST STG II ENG		
11	BEGIN CONSTR 1 ST OPNL SQ		
12			
13	LAUNCH X RIG		
14	LAUNCH X ALT START MSLE		
15	START LOT X CAPTIVE TESTS		
16	LAUNCH 1 ST RIG CLOSED LOOP FLT		
17	LAUNCH 1 ST HI - FLT LOT X		
18	CONSTR 1 ST AIRCRAFT INF		

NUMBERS INDICATE TIMES RESCHEDULED

← ACCOMPLISHED ON SCHEDULE

CUMULATIVE AMOUNTS

DOLLARS IN MILLIONS

FT. MONTEBELLO

TOTAL FUNDS PROGRAMMED FOR CONTRACTOR

FUNDS GIVEN TO THE CONTRACTOR

ACTUAL FUNDS SPENT BY THE CONTRACTOR

DEVIATION FROM

PROJECTION



In the room above, top Air Force missile managers use charts like the sample portions shown here to stay on schedule, spot pitfalls. From the top: total program milestone summary; contractors' financial management status; configuration and subsystem milestone records; contractors' manpower on job.

(1) Figure "A" Item Deleted **(2) Description of Item** **(3) Functional**

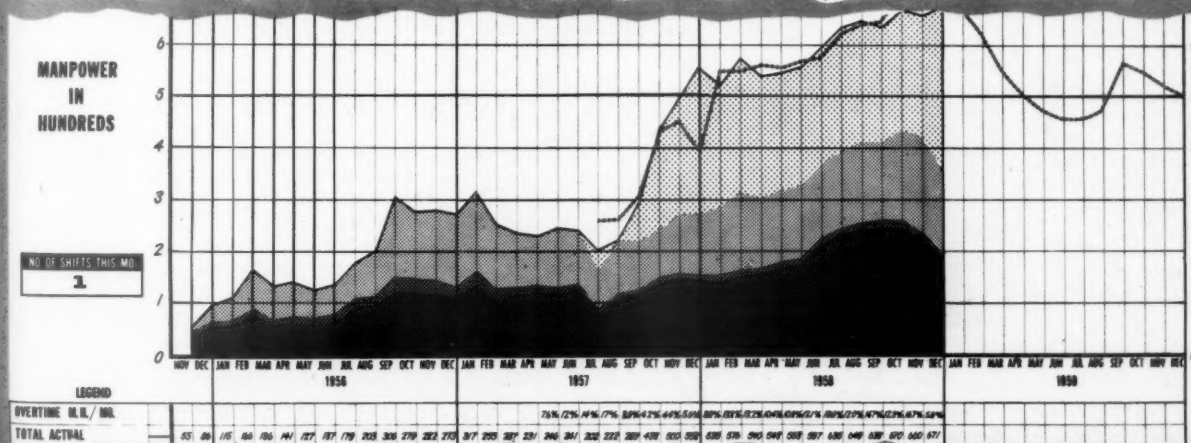
-----XXX-----

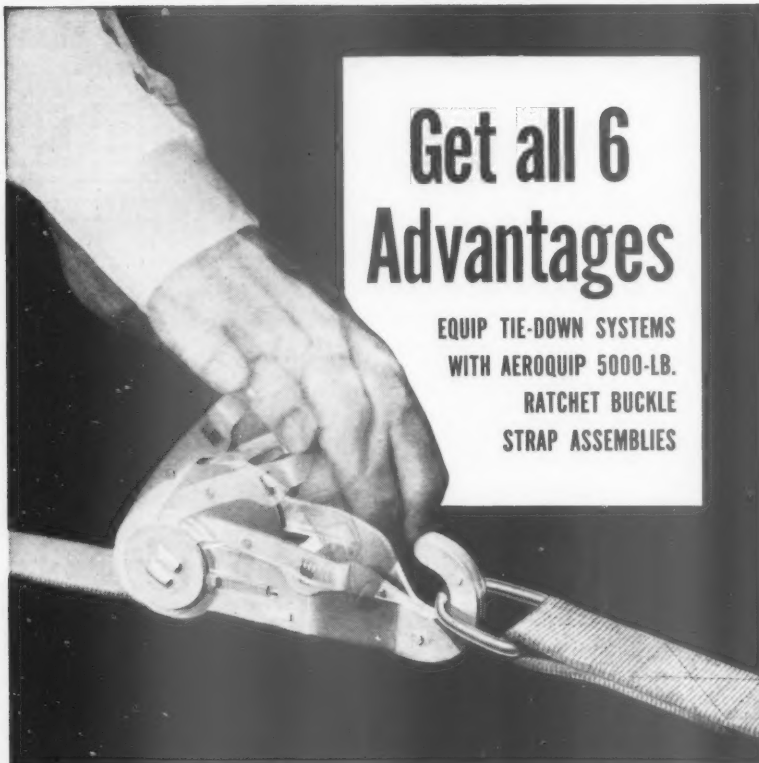
(5) Figure "A" Number → 701 001 **DELETED** LAUNCH CONTROL GRP-YLR MTR B

(6) Figure "A" Number Suffix → 001A 001 DMC# 5881701

(7) DAC Reference Number → 001B 001 MOD# 9999999999999999
SPC# 8888888888888888
SM # 7777777777777777

1	65	1	TST-COMPONENT	DAC	AFS	04	58	04	04	58	PA
2	65	1	TST-SUB SYST	DAC	AFS	05	58	05	02	58	PA
3	14	2	SQDN RAF 1	PCE	CCF	04	58	06	06	58	PA

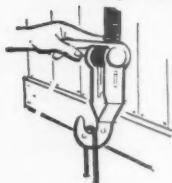
[illegible]



Get all 6 Advantages

EQUIP TIE-DOWN SYSTEMS
WITH AEROQUIP 5000-LB.
RATCHET BUCKLE
STRAP ASSEMBLIES

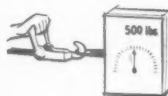
Easy Tensioning



Winch action permits rapid strap tensioning of any desired amount, with simple ratchet operation.

High Tension

Ratchet-type buckle permits introduction of tension up to 500 lbs. by hand . . . 2 to 3 times better than similar buckles.



Infinite Adjustment



With the Aeroquip Ratchet Buckle, you can make any needed webbing adjustment, spool up to 4 feet of nylon webbing.

One-hand Operation

In confined spaces or in turbulent flight, loadmaster can adjust any strap tension with simple, one-hand operation.



Instant Retensioning



Where cargo shifts or settles, webbing slack is taken up by pumping ratchet handle until proper tension is reached.

Safe Release

Double action release eliminates accidental loss of tension. Only spool rotates to unwind webbing, prevent handle backlash.



Get complete information: Write for Bulletin GL 252.

General **LOGISTICS**
A DIVISION OF **Aeroquip** CORPORATION

2929 Floyd Street, Burbank, California
For more facts request No. 109 on reply card.

There could be many reasons for deviations, but the charts themselves are an effective tool for visually spotting potential trouble areas. The *Financial Management Chart* information is reviewed by top Air Force management at least once a month and by the project officers more frequently.

Contractor Manpower Charts

Program managers must be assured that the top National priority program is receiving support in *all* resource areas—including manpower. From another point of view, manpower data in conjunction with financial, milestone and other data presents management with a comprehensive picture of whether the program is in trouble or going according to plan.

There is a *Contractor Manpower Chart* on each major contractor in the central reservoir of data. The important elements of information on these charts include: The different types of manpower employed, the categories being standardized among the ballistic missile contractors; The contractor's projection of his manpower needs.

Other Reservoir Records

Up to this point we have discussed several "families" of records in the central reservoir. Altogether, there are approximately four hundred full-size charts besides punched card records in the *central reservoir of data*.

In contrast to the specialized records are the general administrative and resource records, such as:

Communications. Installation of world-wide communications networks—planned and managed by the Air Force Ballistic Missile Division.

Airlift. Indicates personnel and material carried by contract airlift in support of the flight test program at the Air Force Missile Test Center, Florida. Controlled by AFBMD.

Budget. Very extensive records concerning budget and funding matters for all facets of the many faceted management program. These records are, in volume and importance, equal to any other "family" of records and details dictated by today's advanced but complicated technology. As the demands for more and more technical, mathematical data have grown with the atomic-electronic era, so have the detailed needs of management grown as a correlary . . . As the technology of the engineer and scientist advances, so must the techniques and tools of the managers.

Concluded next month

ARMED FORCES MANAGEMENT

Why Commercial Re-Supply Works in the Far North

With DEW Line and AC&W sites in the far north representing a key link in the nation's defense, there can be no question of the need for fast, thorough supply operations. This is why commercial re-supply is helping to solve the problem. . .

by Pfc. Randall Chuck

DOTTING the storm-cloaked Aleutian Chain, scaling the endless tundra of Alaska's western coast and sweeping across the wind-lashed ice shelves of the Arctic plains, a series of polar electronic sentries stand guard in the opaque wilderness.

These sentinels are the Distant Early Warning Line (DEW Line) sites and Aircraft Control and Warning (AC&W) stations that stand a lonely vigil, alert against those who would attack the United States over the Trans-Arctic Route.

The annual logistical support and resupply of these remote Air Force sites—Project Mona Lisa—is a modern sequel to Jack London's epic tales.

Climatic and oceanic conditions that envelop the Alaskan coastal sectors are far from favorable. At best unpredictable, they make the resupply problem difficult and often dangerous. Shallow waters force large cargo ships to anchor many miles out to sea. Cargo must be reloaded on shallow-draft lightering craft that can negotiate the remaining distance to the beaches. Pounding surf and sea swells toss landing craft about like leaves in a wind-storm. A capricious fog can become so dense that radar is needed to guide the craft into the beach.

The sea, the climate and the constant threat of being iced in are only part of the difficulty. Problems are compounded by beach conditions and inaccessibility of site storage areas. At many sites, the area where craft can be landed is limited to 100 yards of rocky beach. Roads leading to the sites are often long and steep, and rock slides pose a constant threat.

When the last "Rolligon" truck trundled its load of cargo across a

snow-swept beach at Point Barrow, the northernmost picket in the Alaskan radar fence, in late September 1958, a bold "mission accomplished" was recorded for the 1958 Project Mona Lisa. Successful completion of the 1958 over-the-beach resupply to remote Air Force stations also marked final transition from a completely military operation to a unique "through bill" service

run by commercial carriers.

For the first time since cargo movements began in support of the United States' far northern radar line, the great fleet of Navy, Coast Guard and Military Sea Transportation Service (MSTS) ships and their supporting Army Transportation Corps landing craft, amphibious vehicles and cargo handling units did not make the long voyage around the Alaskan coastline.

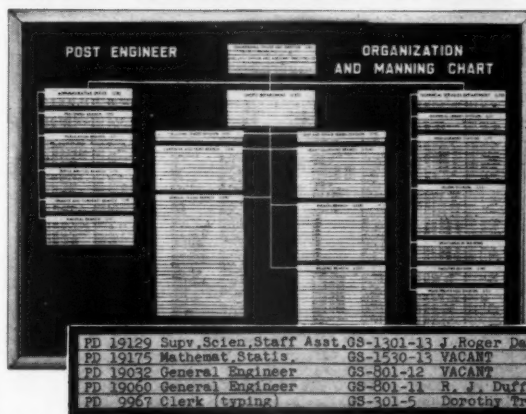
Although the military resupply of the remote sites was successful, a radical change in the concept and in the magnitude of the resupply program was introduced. With the sites requiring resupply going from seven in 1952 to over thirty in 1958, the Air Force sought ways of cutting costs to a minimum. Anticipating that annual resupply program requirements would be attuned to an air logistics system, a

STOP COSTLY RE-DRAFTING OF ORGANIZATION CHARTS

THE COFFIELD EVERLASTING *Interchangeable* ORGANIZATION AND MANNING CHART

EASY TO CHANGE

A typist, a typewriter and furnished perforated strips are all you need to keep your chart up to date!



Write for free Illustrated Brochure AF-8 or Consult our GSA Federal Supply Service Contract GS00S-22310 Group 74—Parts 3 and 2—Item No. 50-63 . . . Code 79.

MANAGEMENT CONTROL CHARTS CO.

1713 N. WELLS ST.

CHICAGO 14, ILL.

For more facts request No. 110 on reply card.

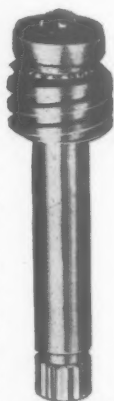
- Sizes to Fit Any Organization Structure
- Photographs for Sharp Prints
- Make Fast Spot Changes
- All Parts Are Movable and Re-usable
- In Government Service Everywhere

ENLARGEMENT OF STRIPS SHOWN IN CHART. Each strip, Actual size 1/4" x 6". This chart permits listing of all personnel by job classification, rating and name, if desired.

10 YEARS OF TROUBLE-FREE SERVICE WITH **BELCO** BALL BEARING EQUIPPED FAUCETS



*Ball bearings convert friction to pressure, eliminating the grinding that causes leaks. No maintenance costs.



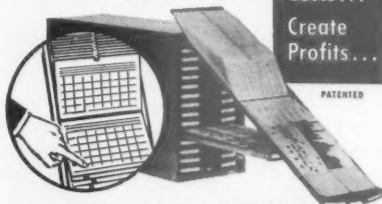
BELCO ball bearing stem races are Aluminum Silicon Bronze; impervious to dezincification which destroys ordinary valve stems. Ball bearings and bibb screws are stainless steel; bibb washers are Buna-N, compounded to withstand high temperatures, give long, leak-proof service. Replace defective faucet stems with BELCOS on a convenient monthly budget plan. Call or write for complete information and sample. Send sample stem for free conversion and quotation.

BELCO DIVISION MILLER MANUFACTURING COMPANY

17640 Grand River, Detroit 27, Mich.
For more facts request No. 111 on reply card.

INVENTORY CONTROL

**Signalled facts
STAY FACTS
with SIG-NA-LOK®**
No undesired slipping of signals.



Prevent
Losses...
Reduce
Costs...
Create
Profits...

PATENTED

**with SIG-NA-LOK®
SIMPLIFIED INVENTORY CONTROL**

Sig-Na-Lok visible control puts your inventory at your fingertips. Every fact needed for effective control is signalled and the signals are locked until the facts change. In one complete record, you'll always know exactly what's on hand and when to reorder. Take the guesswork out of inventory—switch to Sig-Na-Lok and you'll

- Prevent over stocks
- Eliminate out of stocks
- Increase turnover
- Decrease costs — increase profits

Creator of Effective Tools for Effective Management

Phone Westport, Conn. CA 7-4111 or write
WASSELL ORGANIZATION, INC.
Westport, Conn.

IN USE IN ALL BRANCHES OF GOVERNMENT
WRITE FOR NEW BOOKLET "SIG-NA-LOK"
SIMPLIFIED INVENTORY CONTROL

Consult our GSA Federal Supply Service Contract
FSC Group 74, Parts III & II,
GSA Contract Number GS-008-18325
Item Number 58-65

For more facts request No. 112 on reply card.

32

reevaluation of plans was begun.

The new concept was to include only food, fuel, vehicles and equipment not readily transportable by air, and other items that warranted a year's stock level because of volume, weight, or other economy factors.

Three objectives were sought: (1) overall cost reduction; (2) increased flexibility in cargo routing and shipping schedules; and (3) eliminating Army stevedoring and lighterage requirements. A fourth objective was also set "if practical"—warehouse delivery of all cargo, to reduce Air Force site personnel and equipment needs.

An ideal solution was proposed by the "through bill" service proposed by several commercial carriers from the West Coast to most inland Alaska points, including the main Army and Air Force stations. By late 1956, commercial carriers had submitted plans and tentative rates for resupplying the Air Force sector of Mona Lisa—from King Salmon on the Alaskan Peninsula to Cape Lisburne in northwest Arctic Alaska. United States Army Alaska and Alaska Air Command transportation planners analyzed the proposals and concluded that the service offered would meet the desired objectives. Initial problems were overcome smoothly, and the entire 1957 commercial resupply was handled successfully. Dollar savings of \$1.25 million was recorded over the estimated cost of continuing military resupply.

After studying carrier capability and tenders, the Air Force decided that a commercial resupply of the DEW Line sites in 1958 was not only possible, but economically feasible.

The Mona Lisa resupply operation is broken down into four sectors—the AC&W Sector; the DEW Line Sector; the Stretch-out Sector; which is the Aleutian extension of the DEW Line now under construction, and the Kuskokwim River Sector, inland sites along the Kuskokwim River.

Carriers were asked to submit three bids on each sector—dry cargo and POL products, both bulk and packaged; and a combined bid. These bids were reviewed and analyzed by the United States Army Transportation Terminal Command, Pacific, and USARL transportation personnel.

Two carriers were finally selected. Alaska Barge and Transport Inc. was charged with delivery of all cargo to the DEW Line sector and POL products to the AC&W sector; and Garrison Fast Freight Inc. was delegated the responsibility of making dry cargo delivery to the AC&W sites and all deliveries to the Stretch-out and Kuskokwim River Sectors.

Arrangements for inter-theater cargo shipment were the responsibility of the

Fort Mason Transportation Terminal Command. A delicate time table was maintained, insuring that cargo arrived at West Coast ports in time for shipment to Alaska via commercial carriers or MSTs-operated or chartered vessels.

Under the newly organized system, DEW Line sites received over 4,000 tons of dry cargo and 8,500 tons of bulk POL. For the AC&W Sector, 5,500 tons of dry cargo and almost 29,000 tons of POL products were delivered. The Stretch-out Sector received nearly 600 tons of dry cargo, and some 9,500 tons of bulk POL. Three Kuskokwim River sites received 855 tons of dry cargo, and almost 4,000 tons of bulk POL.

Cost of commercially resupplying the DEW Line was approximately \$1.7-million—roughly \$3.5 million less than estimated costs for a military operation.

Considerable savings in Army, Navy and Air Force manpower have also been realized. Commercial resupply eliminated the need for Army personnel in stevedoring and lightering. Warehouse cargo delivery ended the need for skilled Air Force site personnel to aid in delivery of goods from the high water mark to the station storage area.

Flexibility in shipping and routing were also achieved, with multiple sailings and deliveries permitting changes as needed. Moreover, only one transportation document, the Government Bill of Lading, was necessary for checking and receiving cargo.

Success of Mona Lisa is a tribute to the cooperation between commercial and military agencies and between the military services themselves. A prodigious shipping job over great distances was accomplished despite a tight time schedule—the open shipping season in the Far North lasts only four months.

Countless individuals, in Washington, in West Coast ports, the Transportation Terminal Command, United States Army Alaska and Alaskan Air Command were instrumental in Mona Lisa's success, along with innumerable civilian tugboat captains, beachmasters and stevedores. Through their efforts, the nation has a unique "through bill" freight service to the Far North.



Short season and harsh weather characterize the problems in arctic re-supply work.

ARMED FORCES MANAGEMENT

THE ing tively nee and nee ment tec plexities tems an funds o plant v value of risen. T to assis technica a staff basic r manager and the

Supp

For techniq control, or quali to work ment in and bac is essen manage ciation in any there is that no money duce a services leads to manage

The in the s to gene tary m mentall handle lieu of the pro before be done techniq ing of

AUGUS

The Personal Roadblock To Effective Management

Although management engineering is a method of improvement that can accrue many benefits, it can do no good unless it has the support of management. These are the obstacles improvement programs must overcome.

by William Moskowitz
Bureau of Aeronautics

THE use of management engineering in the Armed Forces is relatively new. With the increased demand and need for more effective management techniques to deal with the complexities of modern-day weapon systems and problems arising from static funds on one hand, and increasing plant value on the other hand, the value of the management engineer has risen. The purpose of this function is to assist top management in solving technical management problems. It is a staff relationship which demands a basic respect on both parties—the management engineer for the manager and the manager for the engineer.

Support Needed

For any management engineering technique whether it be production control, manpower control, cost control or quality control (to mention a few) to work, the support of top management in both installing the technique and backing it up with full utilization is essential. Top management must be management minded with full appreciation for what can be accomplished in any situation. The philosophy that there is always room for improvement, that no system is perfect and that man, money and machinery can always produce a greater quantity of goods or services, is the type of philosophy that leads to the need and effective use of management engineers.

The development of this philosophy in the armed forces cannot be expected to generate overnight. Since top military management has been trained, mentally oriented and equipped to handle mostly operational problems in lieu of strictly management problems, the process will take a number of years before full appreciation of what can be done with management engineering techniques is manifested. The educating of future top officers in the tech-

niques and the demonstration of actual results from past installations has to be accomplished before management engineering can capture its real stature.

Recognizing that management engineering is in its infancy in the armed forces, and that much selling, education and development of harmonious relationships has to be developed, there is still one basic element lacking before full utilization can begin to take hold. This is an incentive for management to reduce costs and improve operating efficiency. In private industry the incentive is monetary. A manager reduces costs on the production line through an improved technique developed by his staff and there is an immediate reward. Profits rise, increased dividends are declared and the manager moves up in the organization. He is respected by his co-executives, as is his staff.

Now let us look at the armed forces. Even if a top officer does install management improvements which result in thousands or millions of dollars saved, what is his reward? Does he get some type of bonus for producing at less cost, do his fellow officers truly respect him for his accomplishment or does he get a promotion? In most instances the answer is "no." So, although it may be recognized that management engineering can accomplish much in the way of economical operation, there aren't incentives for top military management to use the techniques.

Stability

Once management engineering policy is determined and carried forth, the continuity of that policy is critical for a business technique to be successful. In many instances, management approves the adoption of a technique, money, time and effort is expended and the installation appears to achieve a degree of success. Then the command is changed bringing in a new manager who may dislike the concepts entirely. If he dislikes the concepts,

the entire program is placed in jeopardy. He will not support nor take active control of the technique.

The only hope for survival may come from middle management personnel who have faith and belief in the technique. But even they cannot breathe life into it unless the manager is persuaded to utilize information derived for management control. We can therefore see that policy continuity in regard to management engineering concepts have to be stabilized, especially in programs which are essentially long-run. In most instances it takes years before all levels of management and the direct worker are thoroughly familiar with the goals and inner-workings of a program. Not until full implementation is achieved and not before reliable statistics are accumulated can management exercise positive action. But if policy is changed in this interim period, not only has management confusion arisen, but a tremendous loss in money and critical time has resulted.

Wrap Up

Management engineering in the armed forces should be looked upon as a long-range program. There are many elements presently lacking for a well-functioning program. This puts a large burden and responsibility on present installations staffing the management engineer. Handicapped in this way, both managers and management engineers have to put forth much greater effort.

Authorities who install improvement programs have to realize the obstacles to be overcome. Support to provide management incentive to all levels of personnel, better management education and continued promotion on the techniques have to be forthcoming before the armed forces and government can move ahead in this area. The tools of the management engineer are available. The potential savings are fantastic.

Pentagon Profile

This Month: Hon. Charles C. Finucane

Ass't Secretary of Defense
Manpower, Personnel & Reserve



"I WOULD like to be sensational and tell you we have all kinds of problems, but that just isn't the case." This is how Assistant Defense Secretary Charles C. Finucane sums up the present Manpower, Personnel and Reserve situation.

Perhaps the major reason for his being able to say this is pointed out by one of his division chiefs—one who is in frequent contact with him: "Mr. Finucane is one of the most mature and level-headed executives that has ever held his post—and believe me, I've worked under every one that ever has. I don't think I can ever remember Mr. Finucane having been knocked off stride."

On August 18 this year, Charles Finucane will celebrate his fifth anniversary in the Defense Department—five years ago on that date he was appointed as the first Assistant Secretary of the Army for Financial Management. Serving in that post until February of 1955, he became Undersecretary of the Army.

This post he held until April 30, 1958, and on June 27, he was nominated to his present job by Secretary McElroy.

From that point on, the record set by Manpower, Personnel and Reserve has been one of smooth operation and steady progress. If Finucane's background is not primarily in personnel work, the record he has hung up during his tenure would certainly indicate solid competence and well-handled administration.

This is the scorecard: Pay raise legislation is on the books—as is provision for proficiency pay. Legislation to relieve Navy's "hump" situation is on its way through Congress. Medicare and other dependent benefit programs are in the works or implemented. For the first time in its history, the National Guard is 100% trained and ready, and the Reserves have achieved maximum readiness status. A hard core of the vital technical skills in all of the services is steadily increasing.

Actually, Charles Finucane's background in personnel work is much wider than is immediately apparent. In a long and successful business career, he gained ample experience in such activities as labor negotiations (as a hotel owner) and general personnel management (working with mining companies, and with Sweeney Investment Co.—as Vice President and General Manager, and later as President).

Within the Defense Department, Finucane points out that about 25% of the work he did as Under Secretary of the Army was directly concerned with personnel problems.

For a position at Assistant Secretary level, Finucane sets the requirements as being Congressional, governmental and military experience with "about six months of hard work" by way of orientation. In each of these areas, the Assistant Defense Secretary for MP&R has experience—and the six months of hard work are witnessed by the full grasp he has of his job.

In 1939, Finucane was elected to the Washington State Legislature, and shortly after that he was named Chairman of the Board of County Commissioners for Spokane County. His state governmental activity continued until June of 1941 when he entered active military service with the Navy. During World War II he served as an Ordnance officer. His duties were largely in staff work.

A Yale graduate (class of 1928), Finucane earned his degree in industrial engineering. The course, he says, was "about 40% business, 40% engineering and 20% liberal arts." Married shortly after his graduation from Yale, he and his wife have recently celebrated their 31st anniversary. While at Yale, Finucane played football for three years. Standing a hefty six-foot-three, it is logical that he held down a tackle's slot with the Bulldogs.

Presently, Finucane's athletic activity is confined to a yearly session of duck hunting in British Columbia and a

tough game of golf. Playing in the Washington, D. C. area at Burning Tree, Congressional and Army-Navy Clubs, he is currently rated an eight handicap.

A measure of the steady manner in which Finucane is holding down his job is pointed up by the recent sound and fury generated by Rep. Frank Kowalski (D-Conn.) on mis-use of personnel. Keeping an even keel through what he himself terms a "very confusing situation", Finucane managed to reduce "an unsubstantiated blanket generality"—a step at a time—until investigating Congressmen were convinced that the situation was hardly as bad as had originally been painted. And that except for a few isolated instances, the times that enlisted men were being "mis-used" were in accord with service regulations. As an example of the justified instances, Finucane points to situations where security-cleared, reliable soldiers are needed, such as serving Chiefs of Staff, or similar high-ranking officers.

It is a measure of Charles Finucane's patriotism that he is holding his present job. After serving as the first Army Assistant Secretary for Financial Management—setting up the office—and after his extended tour as Under Secretary of the Army, Finucane resigned to return to Washington state to attend to personal business interests (including a founding partnership in Finucane and Galland, handling commercial buildings and general insurance, and a Director of the Spokane and Eastern Division of the Seattle First National Bank).

Less than two months later, Defense Secretary Neil McElroy got in touch with Finucane: William Francis, then Assistant Secretary for MP&R had died, and would Finucane take over the job. The answer, of course, was yes—and on July 11 the Senate confirmed the appointment, paving the way for the fine record that has been built by Charles Finucane in his present job.

ARMED FORCES MANAGEMENT

Reliable
more in
cially fo
tems. M
field rec
quality.
point is
tion fro

"Modern
ment re
equipm
MUST
as the e
thought
it so. In
cal mar
in a pr
of cost
standar
technic

MODERN WEAPON SYSTEMS

Depend on Reliable Technical Manuals!

Reliability is the key factor stressed more and more in military equipment procurement, especially for components of modern weapon systems. Maintaining equipment reliability in the field requires Technical Manuals of exceptional quality. The thinking of the military on this point is clearly reflected in the following quotation from Specification MIL-M-005474B:

"Modern weapon systems and support equipment represent a vastly increased complexity in equipment, with the result that each manual **MUST** be, and shall be, engineered as carefully as the equipment which it covers; sufficient time, thought and energy shall be expended to make it so. In sharp contrast with any idea that technical manuals can be a "cheap and dirty" effort in a program involving design and production of costly and complex equipment, a new high standard shall be sought in the development of technical manuals produced to this specification.

The cost of operation and maintenance can skyrocket when Service personnel fail to 'get the word,' that is, when they fail to get clearly understandable, well-written and well-illustrated manuals."

We are gratified to note this firm statement of policy since it defines a quality of service and product which is standard with Spruce Co. Each project, large or small, is directed by a publication engineer supported by quality control procedures and complete production facilities. With this approach we are able to consistently produce the accurate, readily understandable and well illustrated technical manuals demanded by the military.

For additional information about the many technical data services offered by R. Spruce Co., write today for the informative brochure "Technical Publications by Spruce."

R. SPRUCE COMPANY

Technical Publications Specialists

608 S. Dearborn Street

Chicago 5, Illinois

An Affiliate of American Aviation Publications, Inc.

R. Spruce Company

608 S. Dearborn Street

Chicago 5, Illinois

Please send me a copy of
your new brochure
"Technical Publications by Spruce"
at no cost or obligation.

Name _____

Title _____

Company _____

Address _____

City _____ Zone _____ State _____

Reorganizing & Maintaining Momentum

Reorganizing on Paper is an easy matter — but to get the job done in the fastest manner, without lost effort, is harder.

Capt. Edwin B. Hooper
U. S. Navy

TO organize a new activity is straight-forward. To reorganize by adding appendages and echelons to an existing activity is the easy way to react to change. To reorganize a staff type activity is not very difficult—in any case line operations will still go on.

The true challenge comes in trying to change organization of an existing government activity in the direct line of responsibility for positive accomplishments, particularly if it is operating at peak load on high priority, complex programs.

The challenge is intensified when there will be no increase in size, when individuals and their grades will be protected, and when projects, will not be disrupted or even temporarily delayed.

Early in 1955 I was chosen as Assistant Chief of the Bureau of Ordnance for Research. I was to be di-

rectly in charge of Bureau research and development.

From the start, the desirability of several steps to improve effectiveness and efficiency was clear. Reluctantly, I concluded that reorganization of the Bureau's Research and Development Division was an essential key step for significant improvement.

This would be most difficult for several reasons. Foremost was the wide scope of the programmatic effort. The research and development responsibility was not narrowly restricted; it extended through the prototype and evaluation stages. End products of the development phase were diverse weapons systems for ships, aircraft, and submarines.

All in all, with three hundred-odd projects, divided into numerous sub-projects and tasks, the annual programmatic effort represented roughly a quarter of a billion dollars.

The nature of the work was extensive and varied, and reached into many technical areas, including ex-

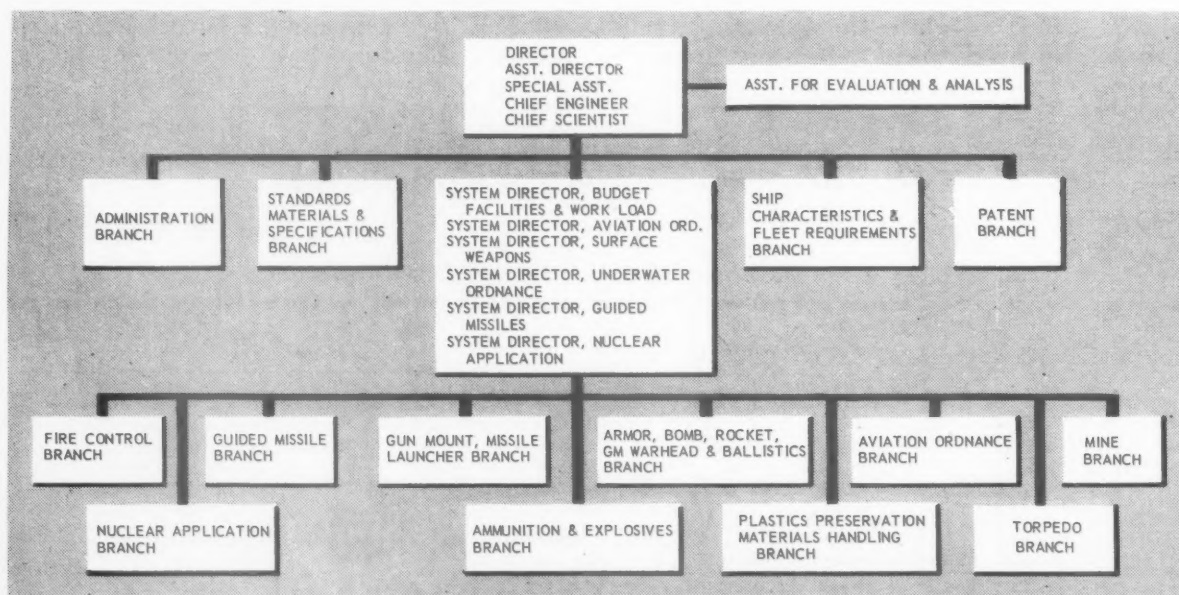
plosives, propellants, propulsion, electronics, radars, computers, guidance, aerodynamics, ballistics, effects, damage, hydro-dynamics, infra-red, radar, optics.

Management in itself was made difficult by the number and diversity of activities involved. The work was divided among a wide variety of facilities and contractors. Major laboratories and test facilities were under Division management control. Much of the effort was in University-operated laboratories. There were of course many industrial concerns involved.

If this were not enough, there were mutual interests with other bureaus, offices, and agencies within and outside the Navy. Bureau of Ships designs the ships and submarines which carry the weapons systems. It also has responsibility for search radars, sonars, and other equipment on which overall weapon system performance depends.

Another special set of relationships concerns nuclear weapons. Joint development projects were carried out by

Before: An Unwieldy World War II Setup



Laboratories of the Atomic Energy Commission and the Bureau.

Relationships in the Bureau itself also required consideration. We could not afford an isolated approach. Research and development alone will not achieve fleet capabilities. The closest team work is imperative from the start. This is particularly true where the production group (Material Division) is involved. In fact, for unity of effort, a close tie is necessary with almost every other important Bureau sub-division.

As a separate entity, the Research and Development Division at Bureau of Ordnance had its start in World War II. The structure was based on sub-division by technical fields. While this made for strength at Bureau level in certain science and engineering fields, optimum development on a systems basis and coordination of systems efforts were difficult. Several semi-independent units, with separate funds and no formal overall control below the top level, were often involved in developing a single weapon.

As a result, system coordinators were brought into the picture. Several times thereafter, efforts were made to increase the authority of these coordinators. They were re-titled as System Directors, and their organization chart positions changed. But there was no basic change at the operating level.

Besides difficulties in systems management and coordination, the existing subdivisions tended to perpetuate projects and inhibit major change. Had it been possible to stop work on conventional weapons at the end of World War II, the rephasing of effort would have taken place then. But this was not the case. Those groups remaining in the conventional weapons field saw a dim future. Minor improvements to existing weapons were draining more effort than were justified.

Even the most casual problem examination made it plain that compromises were inevitable, including such fundamental compromises as between technical fields and system management. The real question was "What was an optimum set of compromises?"

Fortunately, the overall climate for change was favorable. Talks with key people in the Bureau revealed a majority feeling that a change was desirable or inevitable. Practically every one, however, warned against any step taken before six months or a year.

Less than seven weeks later, the reorganization was complete, except for the lingering throbs of civil service classifications. Offices, code numbers, phones, and files had been shifted and rearranged groups were functioning without a perceptible hitch in their effort. Within four months, the

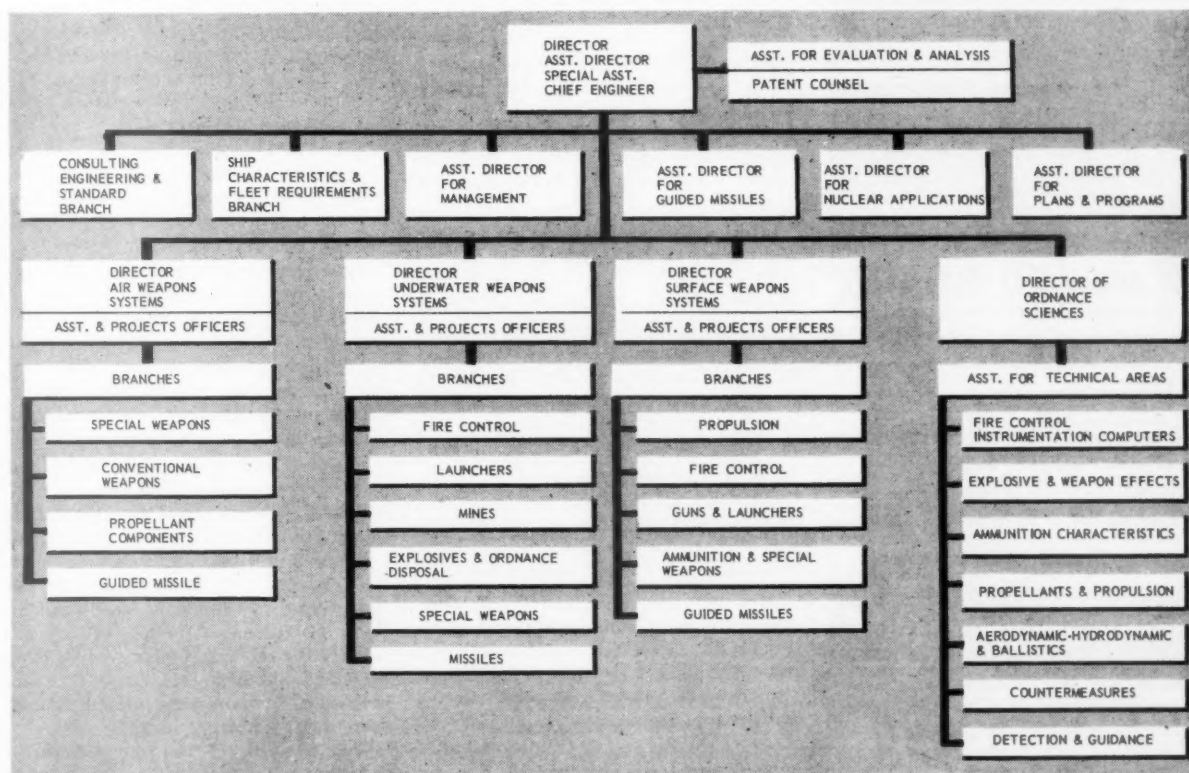
program structure changed, and projects had been reduced by consolidation and elimination to about a third of those previously in effect.

The first step was to assemble the nine or ten key officers and civilians for a two-hour blackboard discussion. After principles and objectives had been outlined, suggestions were asked on a basic organization to gain the objectives. The diagram which unfolded was essentially the same as one privately developed earlier.

The objectives went like this:

1. Continuity. Progress on existing projects must not be hampered.
2. Hardware project management by systems. Only one person—below the top level—would be directly responsible for everything connected with each system.
3. Adequate provision for the more distant future. Research, advancing the state of the art, maintaining technical competence, and maintaining and increasing a technical knowledge reservoir would be emphasized.
4. Protection of each individual's grade and status.
5. Full use of experienced personnel.
6. Providing promising futures for the civilians. Those in obsolescent fields should be allowed to shift to new and more glamorous ones.
7. No total personnel increase.

After: An Organization Geared to the Future



When Time is Ripe for Change . . .

8. Personnel grade increases, if any, would be incidental and not an objective.

9. A minimum staff.

10. Flexibility to meet technical advances and changed requirements.

11. Immediate implementation. Perfection was not a must. Undesirable features would be overlooked if their solution might cause delay.

Having agreed upon the basic structure, key, high level personnel were told to draw up their own organization and the list of individuals to man it. While freely discussing pros and cons with each, I refused to direct any change in their own areas. Thus, the person responsible for a program had full authority and responsibility to determine his own organization.

It was important to immediately brief the next two or three echelons on plans and objectives, and to seek full cooperation. It was stressed that this was an organizational adjustment, not a new organization. The briefings evoked no immediate questions or discussion. But shortly, suggestions came flowing in, directly and through various channels. The vast majority were thoroughly constructive.

Almost all conflicts were resolved by compromise. Several reached conferences with me. But, as mentioned before, in only one case did I have to make the final decision. This involved a difficult compromise between maintaining the unity of a technical group and the systems approach. The decision was directed to systems management. Unified hardware programs and projects can come only from the top—in a laboratory the decision might well have been different.

Only the process of civil service personnel classification was irksome and hindered progress. Research and development must be dynamic. Quick, efficient response to technological progress and new requirements requires regrouping from time to time. In this case, each organization change raised a question as to the GS rating of each civilian involved, whether his primary qualifications were technical or administrative. The ratings of several people appeared long in jeopardy, straining their morale and placing a burden on their seniors. Innumerable and regrettable long hours were expended by key personnel, in reclassifying over many months. In the end, one person had been demoted, while a number were advanced in grade.

Instead of the former ten technical branches, coordinated by six systems directors, there were now four operating units headed by four directors. With undivided control, these directors had direct authority over all organizational elements required in fulfilling their responsibilities—responsibilities which extended to full weapons systems.

Although the Systems Directors were to conduct research related to their responsibilities, there was the danger that this would be restricted to immediate problems. This danger was cut by establishing an Ordnance Sciences Group under a civilian director. The latter was also charged with countermeasures research and study, applying a point of view different from those in development.

Establishing an Assistant for Plans and Programs aided in getting out the first Bureau of Ordnance Long-range Research and Development Plan.

Keeping an Assistant for Nuclear Applications meant centralized contacts with Atomic Energy Commission and Armed Forces Special Weapons project, and meant uniform nuclear weapons policies.

Chief Assistant for Guided Missiles was an apparent requirement in view

of specialized treatment given these weapons by other elements in the DOD and the Navy.

I do not imply the new organization was an ideal one. Some shifts were bound to have adverse effects, even though the overall balance was favorable. Some changes were deferred to avoid overall delay. Others were not taken because they would have disrupted current programs. Nevertheless, the structure set up to grow in healthy directions. Further beneficial changes have been made, each aiding initial principles and objectives.

How was it that such an extensive reorganization was accomplished so smoothly and successfully? The answer lies in a number of factors:

1. Time was ripe for change.
2. Preliminary thought was given to all facets of specific management problems.
3. Specific objectives were formulated.
4. The organization directly followed these objectives.
5. Effort was made to protect individuals from pay or prestige losses.
6. Minor improvements did not interfere with major ones.
7. The step was prompt and decisive, and no consolidated opposition developed.
8. Complete authority and responsibility for organization details was delegated to those responsible for future achievements.
9. Full recognition was given to the past (the experiences of individuals), —to the present (the existence of active projects), and to the future (the momentum of existing projects).
10. Points of responsibility were clearly fixed at the start, and sub-divisions were packets which could be managed effectively without large staff structures.

Reorganization should not be undertaken unless it is really needed and unless it is clear that long term results will justify the action. No two reorganization problems are alike. A thorough understanding of the specific nature of the organization's duties and relationships is essential.

Finally, resistance to change exists in any organization. This resistance is stiffened by civil service rules and safeguards. Nevertheless, established governmental organizations do not have to be static. They can be reshaped and reoriented to meet change. Such a step makes use of existing resources. It is far preferable to the popular approach of meeting each new need with a new organizational unit, and allowing existing ones to wither away or to linger on—more as liabilities than assets.

Spot and prevent trouble at a glance



NEW! VU-BOARD®

BY THE ORIGINATORS OF WALL BOARD CHARTING AND PRODUCTIONS

Low cost — unlimited Visual Control

- Shows all important data—a fast, accurate, complete picture
- Easy to set up and operate—wall or desk use
- Boards fit together horizontally or vertically to increase item capacity
- Inserts can be shifted without removing from board
- Solves all machine load problems
- Unlimited uses for scheduling, charting, dispatching, etc. — in all phases of business and industry
- Light, compact all metal construction—designed for a lifetime

Only \$49.50 complete

Phone Westport, Conn. CA 7-4111 or write

WASSELL ORGANIZATION, INC.

Westport, Conn.

IN USE IN ALL BRANCHES OF GOVERNMENT

WRITE FOR NEW BOOKLET "VU-BOARD"

Consult our GSA Federal Supply Service Contract

FSC Group 74, Parts III & II.

GSA Contract Number GS-09S-18325

Item Number 50-63

For more facts request No. 114 on reply card.



Procurement Trends

DIRE PREDICTIONS OF "WEAKENED GOVERNMENTAL CONTROL" are emanating from General Accounting Office in relation to the Saltonstall procurement bill—which has been endorsed by Defense as the best alternative of several procurement bills before the Senate. Testified one GAO Ultra-progressive, "practices . . . of placing fewer but larger contracts for complete operational systems . . . appear to make renegotiation more necessary than ever."

A MONUMENT TO CONGRESSIONAL MEDDLING has been erected in the form of the dual procurement check measure passed by a House/Senate Conference Committee as AFM went to press. Most likely result of the bill: approximately twice the time wasted by military personnel in hearings before Congress. Benefits to be gained: another round of nit-picking—duplication of testimony by military chiefs—extension of budget process which will make it almost a full year's job.

NEW AREAS ARE BEING EXPLORED FOR NAVY'S PERT SYSTEM (see July AFM), even though the system is not fully set up as yet. The new areas: (1) cost prediction, as opposed to time evaluation in the present operation. (2) evaluation of bids for contracts, checking out cost and time estimates—"quite a competitive tool," according to one PERT planner. And, (3) further work with simulation techniques aimed at picking best alternatives for fastest and cheapest program completion.

EXCESSIVE ROTATION RATES AMONG PROCUREMENT OFFICERS, coupled with low pay and qualifications for civilian workers in this area, means that a few obvious changes might do much to help out the much-criticized procurement system. On the military end, Air Force has already begun working to have tours extended for officers working with the WSPO's and as contract representatives.

"SUBSTANTIAL IMPROVEMENT" IN THE MILITARY PERSONNEL area has been cited by Office of the Ass't Secretary of Defense (MP&R). Among the trends: re-enlistments up, especially in top-skill areas; total service averages up; mental group averages up; experience level higher. Summing up—"there has been a substantial improvement in the capability of the Armed Services to attract and retain qualified personnel."

OPTIMISTIC REPORTS ON T-38 AND N-156F HAVE BEEN RELEASED by Northrop, and backed up by the Air Force. The contractor says the planes are on schedule, AF estimates that they are a bit ahead. N-156F will have century series performance at about two-thirds of the cost.

FOLLOW-UP MOVE ON DECISION TO BUY SS-10 Nord Aviation anti-tank missile may lead to licensing of manufacturing rights to a U.S. firm. The French-developed missile will be used by Army, along with the similar but larger SS-11.

FURTHER REVIEW ON THE DYNA-SOAR DEVELOPMENT PROGRAM is under way by an Air Force Source Selection Board. Points in question concern booster for the vehicle, and managment system to be used. AF hopes to get the program underway sometime this month.

A NEW METHOD FOR STATING AIR FORCE REQUIREMENTS is in the works, aiming to distinguish between state-of-the-art and beyond-the-state-of-the-art-AF needs. Present General Operational Requirements would be replaced by Specific Operational Requirements and System Development Requirements. The latter would aim to give more leeway to contractors working on development projects.

Procurement Trends

Saltonstall Bill Likely To Pass Early Next Year

Differences between Defense Department and the authors of the highly-touted Saltonstall procurement bill (S. 500) will probably be ironed out within the next few weeks, but it is highly unlikely that the bill will get to the Senate floor for a vote before Congress recesses later this summer.

One of the major reasons for this is that hearings on the bill were delayed, and then ran longer than anticipated. However, Assistant Defense Secretary Perkins McGuire (S&L) has endorsed the bill with minor reservations, leaving the door open for compromises which will probably speed the bill through committee.

Specifically, DOD has objected to emphasis placed on "Single Managership" for the operational weapons systems as suggested by the bill. Since the problem seems to hinge on semantics, it is likely to be resolved. Saltonstall has agreed to accept changes proposed by Defense for the specifications section of this bill.

On the controversial matter of negotiated vs. advertised contracts, Saltonstall and his staff will attempt to define the conditions under which contracts may be negotiated. The aim is to co-equalize the two kinds of procurement, allowing for negotiated procurement where needed while maintaining competitive bidding as much as possible.

GAO Levels Charges At Navy Procurement

Navy is the latest target for Government Accounting Office charges of lax contracting procedures, resulting in excess costs of \$12 million on 14 Navy contracts. GAO also charged that Navy procurement officers are underpaid for the responsibilities they hold.

In quizzing Navy witnesses, House investigators suggested that this underpayment might be partly responsible for "inadequate review and evaluation" of Navy contracts. Assistant Navy Secretary C. P. Milne told the committee that most of the contracts in question were let during the Korean War, and that since then, the system has "vastly improved."

VAdm. E. W. Clepton, Chief of Naval Material, agreed with House investigators that 37% of Navy's negotiators were graded low by civil service standards, but indicated that these men served generally as "mouthpieces" for higher ranking officials.

GAO also charged that Navy is allowing its prime contractors to keep full profits on subcontracted work, and indicated that Navy "plans to do nothing to correct the apparent inequity of allowing a prime contractor the same rate of profit on major subcontracted components, on which the contractor performed comparatively little work, as on the part of the contract work performed by the contractor."

Quality Control Needs Outlined by Defense

Defense Department has spelled out its quality control needs in Mil-Q-9858, laying major responsibility on the contractor for establishing necessary procedures, subject to government veto.

Generally following the Air Force system (see p. 10), the rules apply to all supplies or services requiring government inspection. Exceptions to the rule cover research studies not involving equipment deliveries, equipment with commercial specifications, and other supplies and services where quality control would be impractical.

In part, the specification states that "the contractor shall maintain an effective and economical quality control system planned and developed in conjunction with other planning developments . . . The system shall be based upon consideration of the complexity of product design, quantity under procurement, interchangeability and reliability requirements and manufacturing techniques. The system shall assure that adequate control of quality is maintained throughout all areas of contract performance . . . The contractor shall make objective evidence of quality conformance readily available to the government representative."

Military Sales Meeting Held at Chateauroux

CHATEAUROUX, FRANCE—A two day Mutual Security Military Sales conference was held here last month, to discuss new Air Force procedures for buying spare parts and emergency maintenance support available to Military Assistance nations.

The new system will allow closer control of parts procurement and permit more efficient use of funds. It will also serve to align foreign logistics systems with USAF methods and electronic data equipment, allowing more accurate estimates of supply status.

Attending the conference were representatives of 15 countries, Military

Assistance Advisory Groups, Hq., USAF European Command and NATO Maintenance Supply Services Agency. The new procedure discussed will give maximum supply effectiveness to air forces of MAP nations, allowing them to buy spares from USAF simply and economically.

Two Martin Missiles To Join New Services

The Martin Co's Lacrosse artillery missile join Army in operational status last month, shortly after Martin announced that Air Force plans to use its Bullpup air-to-surface missile, which has been in production for Navy.

Bullpup—which will be redesignated White Lance by AF—is the second Navy air-carried missile that has gone into the AF operational inventory. First was the Sidewinder air-to-air heat seeking missile.

Lacrosse officially became a combat-ready weapon system with the delivery of tactical equipment at Ft. Sill, Okla. At the same time, Army has activated a third Lacrosse battalion, and has announced plans to activate a fourth by the end of the year.

Weapon System Work To be Reviewed by AF

Air Staff is conducting an across-the-board review of the weapons system management concept, with an eye to discovering whether too much authority is being delegated to AF prime contractors.

Another area of the study will be to evaluate the effectiveness of separating research and procurement functions. On one side of the dispute is a thesis that Air Research and Development Command should confine its work to basic and applied research, leaving development and procurement to the Air Materiel Command, as would be indicated by the present Air Force funding structure.

Opposed to this would be proponents of the Stever Report, who hold that ARDC should be given its own funds to work with. It is unlikely that Air Force will find a definite answer to this question, which has been a perennial thorn in the side since ARDC was formed.

Industrial Security Bill Proposed to Senate

A measure overruling the Supreme Court's decision in the Greene case—thereby reinstating an industrial security program—has been proposed by Sens. Olin Johnston (D-S.C.) and James Eastland (D-Miss.). The bill would

deny access to information to employees of government or a security agency.

Another payments did not ity regulate a chance ity situation maintain measure-

Contract Set up

Relative its prime tenance out in A by the class ma maintenance pair acti-

The m between their pr is for enance co support depot m toward tooling maintain-

Army Recer

A new vehicle-demonstr travels 35 mph

The v and w cargo f



Side-load Army's by a 27

AUGU

deny access to the accused of files or information relating to charges that an employee of either the Federal Government or a defense contractor constitutes a security risk.

Another part of the bill would bar payments to defense contractors who did not comply with industrial security regulations. Besides giving Congress a chance to study the industrial security situation, the bill would merely maintain a status quo until a better measure—if needed—could be set up.

Contractor Relations Set up by Air Force

Relationships between Air Force and its prime subcontractors in initial maintenance support programs are spelled out in AMCL 65-5. Primarily effected by the new rules will be commodity class managers and the directorate of maintenance engineering specialized repair activities.

The new rule permits direct contact between commodity class managers and their prime and sub-contractors. Aim is for earlier establishment of maintenance concepts and parts and the ground support equipment need for field and depot maintenance. The rules also look toward earlier evaluation of production tooling and test equipment needed for maintenance support, so capabilities

exist when needed.

Obtaining blanket approval from primes for direct contacts with vendors and subcontractors is the responsibility of the logistic support manager. One of these contacts would be to set technical guidance or maintenance pre-planning meetings, before establishing repair parts breakdowns and ground support equipment lists.

DOD Sets New Rules For Advisory Groups

Anti-trust and conflict of interest problems are the targets for a new Defense Department Directive (5030.13) concerning formation and operation of industrial and public advisory committees.

In forming such committees, says the directive, size of the company, location, affiliation and industrial function of the components represented will be considered. Another provision will bar manufacturer's representatives, attorney's and other persons not actually in the industry from representing it.

Committees must be approved by either the Defense Secretary or the service Secretary involved, and the chairman must be a full-time, salaried officer or employee of the Government. The chairman will determine the com-

mittee's agenda and certify its minutes.

Department of Justice has reserved the right to enforce anti-trust measures against such committees when necessary or applicable.

Mule Contract Awarded To Willys Motors, Inc.

A \$2.5 million order for M274 Mechanical Mules has been placed by Marine Corps with Willys Motors, Inc. The new units—the second Marine order—are set for delivery by August 1960.

The Mechanical Mule is made mostly of magnesium and aluminium, weighs only 900 lbs. and can carry 1000 lbs. Four-wheel drive and optional four-wheel steering make it useable in rough terrain. Powered by a four-cylinder engine, the vehicle is air-droppable.

Curtiss-Wright Case Decided by ASBCA

Curtiss-Wright Corp's appeal on termination inventory on a 1951 letter contract has been decided by Armed Services Board of Contract Appeals in favor of Curtiss-Wright. Air Force has entered a motion for reconsideration.

The Board concluded that Curtiss-Wright "is entitled to price this termination inventory in accordance with its established accounting procedure, i.e. standard costs adjusted by the composite variance, in effect on the date that the appellant charged the inventory to the Government."

In the meantime, Curtiss-Wright is still awaiting the outcome of another case, in which it is charged with owing the Government about \$5-million in back rent on government-owned facilities.

New Shipping Container Built for STRAC Forces

Improved mobility for Army's STRAC forces will result from introduction and use of a new light-weight, inexpensive fiberboard shipping container. The containers would be used pre-packed, and when palletized, offer a 60% reduction in packing and crating materials, plus time and weight savings.

Made of triple wall, weather-resistant corrugated fiberboard, the expendable containers come in two sizes, and have a 1000-lb. capacity. The containers can be used with Army's standard CONEX container, which will hold six of the new cartons. The containers are now being tested by Army's Transportation Research and Engineering Command.

Army Amphibian Craft Recently Introduced

A new light-weight amphibian cargo vehicle—called LARC—was recently demonstrated to the Army. LARC travels in water at 10 mph and up to 35 mph on land.

The vehicle hauls 5 tons of supplies, and would be used for transferring cargo from ship to shore. Made of

aluminum, the LARC is 35 ft. long, 9 ft. wide, and is powered by a 270 hp engine.

Already in operation is BARC, a 60-ton version of the amphibian. Another model, a 15-ton LARC is expected this month. The vehicle features simplicity, ease of maintenance, and the ability to travel through heavy surf. Builder of the LARC is Borg-Warner Corp., Kalamazoo, Mich.



Side-loading—as shown—and a watertight cargo deck are two features incorporated in Army's new LARC-5 cargo amphibian. Single propeller for water operation is powered by a 270-hp Ford engine.



Research Rundown

DEVELOPMENT CONTRACTS FOR A NAVY NUCLEAR SEAPLANE have been awarded by Navy to The Martin Co. and Pratt & Whitney. The two contracts—slightly over \$2-million—generally define the direction Navy will move in A-plane development. P&W will work on an indirect cycle engine, and Martin's airframe will be built specifically for anti-submarine warfare work. Number one problem to be licked, according to VAdm. J. T. Hayward: "The fundamental truth about the nuclear propulsion business is that we do not have a successful fuel element."

ADVANCED VERSION OF THE HAWK—CALLED SUPER HAWK—is a gleam in the eye of advanced Army planners. To date, no decisions have been made on the project, which would roughly parallel work being done by Navy in improving Talos and Terrier missiles. Although the Super-Hawk is little more than a proposal, Army sources questioned admitted that they "are always looking for new systems."

A STUDY OF THE TRUE VALUE OF AND NEED FOR BORON FUELS is being run by Arthur D. Little, Inc., under the sponsorship of Defense Department. Early reports on the consulting firm's findings seem to indicate that present technology has already by-passed boron for more exotic fuels.

BAD BATTING AVERAGE ON MISSILE AND TEST FIRINGS are a cause of growing Pentagon concern. With Atlas now unable to make predicted operational date, Polaris below par, only the Titan with a respectable score, chances for a new round of Congressional hearings appears likely. Target of possible probe would be research methods and organization, plus testing procedures.

CONTRACT ON MAULER SHOULD BE LET SOON, will provide Army with a highly mobile, self-propelled missile system for forward element air defense. Another close-in Army support system, originally announced as Shillelagh, may get a name change, becoming Pentomic. Pentomic is vehicle mounted, surface-to-surface missile for use against armor, troops, and field fortifications.

ORGANIZATIONAL CHANGES AT AIR RESEARCH AND DEVELOPMENT COMMAND are in the immediate offing. Studies which have been in the works for the past two years are being distilled, will be turned over to new ARDC Commander Lt. Gen. Bernard Schriever. ARDC sources say that the changes—when they come—will be fairly extensive.

"INTEGRATED STRIKING FORCES INDIGENOUS TO SPACE" are needed in the military inventory, say sources at the Air Force Ballistic Missile Division. Ballistic missiles alone are not enough. High on the list of priorities for such a program would be communications, early warning and strategic warning equipment. Short term Air Force plans seem to center around making what they have work.

PROPOSAL TO HELP OUT ON AN OLD PROBLEM—inadequate facilities for translation of foreign technical publications and reports—has come by way of the Commandant's report from the Army Language School. Offer would be to translate, digest and distribute this sort of material to interested agencies. At present, none of this sort of work is done at the school.

DEVELOPMENT PORTION OF WEAPON SYSTEM MANAGEMENT CYCLE—along with the rest of the WS cycle—will be the responsibility of AF's Deputy Chief of Staff for Operations, under new AFRs in the Pentagon mill. This office will also now have responsibility to order a development project into production. Pentagon sources feel this step will be the first of several, treating such matters as source selection and weapon system management.

New ARPA Projects Cited, AF Funds Set for Others

Six new projects have been announced by Advanced Research Projects Agency to begin in fiscal 1960. At the same time, Air Force has set aside \$23.5 million for two other ARPA projects, Midas and Sentry.

Code names for the new space programs will be *Tribe*, *Suzano*, *Defender*, *Principia*, *Pontus* and *Longsight*. *Tribe* will be a "continuing family of advanced military space vehicles capable of satisfying needs for space missions." *Suzano* will lead to development of a space platform. *Defender* will encompass feasibility studies for advanced space defenses.

Principia aims at development of solid rocket fuels with 10-20% better specific impulses. *Pontus* is a materials research program. *Longsight* includes "unorthodox and creative studies aimed well beyond normal product improvement and such tasks as the Guideline Identification Program for anti-missile research currently being conducted in the missile defense field." Aim will be recommendations for advanced systems for the Secretary of Defense.

Improved Terrier Produced by Convair

Convair, a division of General Dynamics Corp., will handle production of a new, two-stage version of Navy's *Terrier* surface-to-air guided missile. Work will be done at the government-owned Industrial Reserve Ordnance Plant, Pomona, Calif.

The original *Terrier* has been with the fleet since 1956, and for a shorter period of time, a land-based version has been used by the Marine Corps. Navy claims "vastly improved" performance for the new missile, which will see its first duty aboard the

guided missile frigate USS *Dewey*. The new missile will eventually supersede the older models now with the fleet.

Better Pilot Capsule Wanted by Navy

A development contract aimed at a better pilot's capsule for high-altitude flight has been awarded by Navy to Chance-Vought Aircraft, Inc. The new capsule would provide greater pilot comfort and safety.

Another aim of the program is to simplify the myriad of equipment needed to protect the pilot and speeds and altitudes increased. The integrated capsule would give the pilot more working area, and still maintain aircraft performance.

Initially designed for use with a plane similar to the F8U-1 Crusader, the sealed-off and pressurized forward section of the plane would also serve as an integrated ejection capsule, with force-sensing drag brakes for supersonic ejection/deceleration.

Emphasis on Calibration Stepped Up by Air Force

Increased emphasis on calibration in measurement and repair work will mean that 168 Air Force Bases throughout the world will eventually be equipped with precision calibration laboratories. Many of these will be in operation by the end of 1959, with 95% of the equipment scheduled for delivery by November this year.

Dictated by the need for millionth-of-an-inch tolerances in missile work, the calibration program already involves some \$6 million in allocated funds. As a part of the Air Force-wide integrated program, contractors will also be required to maintain similar facilities.

Calibration laboratories will be staffed with about one technician for each 200 pieces of equipment. Average number of pieces will be about 2000 per base, with Wright-Patterson AFB having about 8000 pieces at the present time.

Standards for the program compare with those of the National Bureau of standards, and are established in AFR 74-2, dated 17 Jan. 1958 and revised 12 May 1959. In connection with the base program, parallel emphasis is being placed on calibration work at the Air Materiel Areas.

One-Man Helicopters Studied by Marines

Marine Corps has accepted three Gyrodyne YRON-1 one-man helicopters for tactical evaluation at Quantico, Va. The craft will be tested for their worth in fields including small unit reconnaissance, liaison and courier service, artillery observance and wire laying.

Preliminary flight tests on the YRON-1 were conducted at Patuxent Naval Air Test Center. Weighing 425-lbs. empty, the helicopter is powered by a 62 hp four-cylinder Porsche engine, turning twin counter-rotating rotors.

Cruise speed is 50 mph, maximum speed is 72 mph, range is 60 miles and service ceiling is 6500 ft. The Gyrodyne craft was co-winner of a design competition with the Hiller XROE-1. The Hiller craft is set to be delivered at Quantico in December this year.

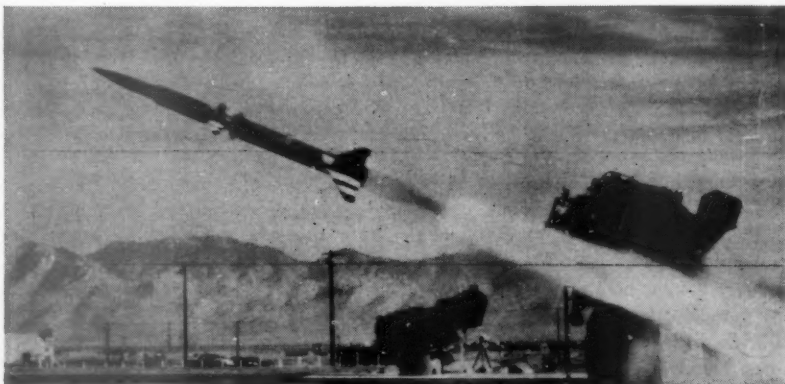
XROE-1 weighs 300 lbs., uses single-rotor/tail-rotor configuration, cruises at 50 mph and has a range of 27 miles.

Decoy Problem Defined By Air Force Scientist

Dr. Joseph Charyk, Assistant Secretary of the Air Force for Research and Development, has said that telling the difference between incoming missiles and decoys is the largest problem currently facing the Air Force in its search for a missile defense.

Charyk called for vigorous pursuit of a solution to the problem, and said that "for each object that cannot be discriminated during re-entry, there will be required the commitment of a separate interceptor missile and the employment of multiple target-tracking and missile-tracking radars."

Charyk cited the "fantastic job demanded of the computer system [which must] sort, eliminate and compute intercept trajectories for a very large number of objects. The problem of programming such a computer is truly a Herculean task."



New and improved version of Navy's *Terrier* surface-to-air missile is test-fired at Navy's Inyokern, Calif. Ordnance test center. Older model of the missile has been with the fleet since 1956.

New Safety Technique To Be Tried by AF

The Air Force's F-106 supersonic all-weather interceptor will be fitted with steel arresting hooks as standard equipment in the future, according to All American Engineering Co., builder of the hook.

The safety measure has been successfully tested at Edwards AFB, where it safely arrested an F-106 landing at 110 knots. Used with the hook are a runway cable and anchor chain barrier. The system has been further proven by long use with Navy aircraft and with Royal Canadian Air Force planes.


Hooks will be manufactured by All American under a \$125,000 subcontract let by Convair, a division of General Dynamics Corp., and prime contractor on the F-106.

Test Tower for Saturn To Be Ready Next Month

The 145 ft. static test stand to be used with the 1.5 million pound thrust Project Saturn booster will be completed by 1 Sept. this year, Army has said. First static test of the booster is set for December.

THE ANSWER TO YOUR FILING PROBLEMS

Saves Time, Labor and up to 40% in Space



CORRES-FILE®

For modern secretaries, Corres-File brings all important papers to her fingertips—as close as her typewriter—making her as fresh at 5 P.M. as at 8:30 A.M. No waste motion — everything's in reach from a seated position.

For the modern secretary and the modern office, install Corres-File and you'll:

- Cut time in half • Save costly labor
- Increase efficiency • Double capacity without sacrificing space

Patented

Creator of Effective Tools for Effective Management

Phone Westport, Conn. CA 7-4111 or write
WASSELL ORGANIZATION, INC.
Westport, Conn.

IN USE IN ALL BRANCHES OF GOVERNMENT
WRITE FOR NEW BOOKLET "CORRES-FILE"

or
Consult our GSA Federal Supply Service Contract
FSC Group 74, Parts III & II,
GSA Contract Number GS-00S-18325
Item Number 50-65

For more facts request No. 113 on reply card.

The Huntsville, Ala. test facility will be a modification of existing facilities. Booster for the Advanced Research Projects Agency-sponsored program will be a cluster of eight H-1 liquid rocket engines. Twenty-two feet in diameter, and about 75 ft. tall, the vehicle will carry a second, third or fourth stage.

Under present planning, second stage of the space vehicle will be a modified Titan and third stage Centaur will use two rocket engines with a combined thrust of about 30,000 lbs. Guidance for the huge space vehicle will be inertial.

Industry Developments

New Kaman Helicopter Being Tested by Navy

Navy has started a full-scale flight test program on the Kaman Aircraft Corp's HU2K high-speed utility helicopter. Two production models of the new craft—powered by General Electric's T-58 gas turbine engine—are under test by the Navy.

The first model of the helicopter is still undergoing tie-down tests, and it was the second that was used for the first flight. The turbine-powered helicopter will have all-weather flight capability.

Aerospace Industries Set Long Range Goals

The need for new materials will dictate the largest portion of the big job ahead for machine tool builders and manufacturers and fabricators of materials over the next ten years, in developing advanced aircraft, missiles and spacecraft.

This prediction was made by Aerospace Industries Assn. in its 1959 annual forecast of trends and requirements. Report was drawn up by AIA's Research and Testing Committee and its Tooling and Test Committee.

Basically, said AIA, the job is to develop materials and alloys which can withstand—at least briefly—3000-5000°F while maintaining necessary low temperature properties. Research, said the report, is not enough in these areas. What is needed is a set of new materials with practical applicability—ones which can be used in aircraft, space vehicles and support equipment.

The report spotted a trend to steel welded and brazed airframes with carefully controlled tolerances and atmosphere. AIA also said that new machines would be needed to fabricate the new materials at economic speeds.

AIA predicted that in the next ten years, sheet will account for about 50% of the weight in new weapons, with castings, extrusions, forgings and bar and plate correspondingly cut. Adhesive bonded honeycomb will see increased use, as will low alloy and die steels and in super alloys, said the report.

GE, U.S. Steel to Work On New Reactor Materials

General Electric Co. and United States Steel Corp. have announced that they are working jointly to develop improved steels for use in nuclear reactors. Aim is to eventually reduce operating costs for reactors.

The privately financed investigation of radiation effects will be carried out entirely on a private test reactor. To be carried out with GE's test reactor, the program is only part of a larger research program being run by U.S. Steel designed to develop better steels for nuclear work.

Properties to be studied include corrosion resistance, irradiation effects, hardness, ductility and radiation damage. The test reactor to be used produces 30,000 heat kilowatts, and can simulate months of reactor operation in hours.

Air Suspension Vehicles To be Tested by Marines

National Research Associates, Inc. has contracted to provide the Marine Corp with two free air suspension vehicles, to be evaluated by the Marines at Quantico, Va. beginning next month.

The vehicles float above ground on a cushion of jet compressed air, and will carry two passengers. Marine specifications also call for the vehicles to be able to operate from nine to fifteen inches over either land or water.

Operating on an "angular jet" principle, the vehicles will be powered by jets of air striking at a 30° angle in relation to the horizontal vehicle. Adjustable vanes in jets at the four corners of the vehicles will enable them to be effectively steered. Gross weight will be half a ton, and the Triumph powered craft will be primarily of aluminum alloy and fiberglass. Contract is set at \$40,000.

ARMED FORCES MANAGEMENT



Newsletter

Armed Forces Management Association

Washington 25, D.C. Phone: OTis 4-7193

National President: Rawlings S. Poole

Executive Director: VAdm. Harry E. Sears, USN, ret.

Chapter Program

Chapter activities constitute the most important single facet of the AFMA operation. It is through the chapters that the membership is largely recruited, administered and operates. One of the principal missions of the National Headquarters is to provide guidance, direction and service to the field activities. It is therefore most important that the chapter program be established on a firm foundation of guidelines. In keeping with this thought, the Newsletter this issue will be devoted entirely to chapter matters.

The year just completed has been one of marked progress for Association chapter activity. For example membership has climbed 50%. The main credit for this growth lies with chapter officials and members, as most chapters contributed to this increase from the previous year. Leading gainers were the following: National Capital, New York, Ft. Benning, Detroit, Atlanta and Mohawk. Two new chapters were added—Great Lakes-Chicago, and Gosport (Norfolk)—giving us a chapter count of 20. Our largest chapters—those with 90 or more members are:

National	327
Atlanta General Depot	131
Atlanta	119
Dayton (Wright Bros.)	102
Chicago	94
Ft. Benning	92
Norfolk	90

Our goal for next year is another 50% rise, not only in total membership but in number of chapters as well. With twenty-four requests to form new chapters now on file in Headquarters, this goal should be possible of realization if the existing chapters continue their vigorous membership drives of the past year.

Principal guidance for chapter activity is derived from the AFMA Chapter Manual, which is now 80% completed. Parts I, II, IV, and V—"Organizing a New Chapter," "Building Membership," "Chapter Administration," and "AFMA Awards," have been distributed. The final Part, "Developing Chapter Programs," should be completed by early fall. Chapters not in possession of all portions of the manual issued to date, or who need extra copies of certain sections for more efficient chapter operation, should make their requirements known to National Headquarters. Headquarters likewise will always welcome ideas which will contribute to the chapter program.

In absence of the "Developing Chapter Programs" portion of the manual, a few suggestions in this area will be outlined.

Developing Chapter Programs

The success of the chapter operation depends to a large degree on the program which it has developed. By the same token, there is nothing occult or difficult about establishing a worthwhile and successful chapter program. The main ingredients are vision, imagination, ingenuity, enthusiasm and a bit of work. The selection of a livewire

Program Chairman of sufficient stature in the installation organization and the local community, is the first step toward a successful chapter program. Add to this the support of the installation commander and a valuable and worthwhile program of activities for the management minded people comprising the chapter is insured. In this connection, we have yet to find a C.O., properly apprized of the AFMA chapter program and how it can assist him in his mission accomplishment, who hasn't given his chapter enthusiastic support and confidence.

The optimum chapter program will show a nice balance between the various elements that go toward making up the program; between civilian and military participation in program events; between Defense, industry and education in the matter of speakers and field trips; and among the Services, when multi-Service participation is possible. Likewise, a certain amount of social activity is highly desirable to cement relations of this common interest group, to indoctrinate families and friends of members in the AFMA purpose, and to enhance the public relations aspects of chapter activity.

Program chairmen and chapter presidents should be ever on the alert to capitalize on known movements of senior military and civilian officials of the defense establishment to enlist their services as principal speakers at chapter meetings. Most of these gentlemen are only too happy to participate in this type of management improvement endeavor, if their busy schedules will permit. Frequently these distinguished guests will co-ordinate their schedules to permit attendance at AFMA meetings, if they have sufficient warning in advance.

Conduct of Chapter Meetings

For the success of the chapter program, it is essential that chapter meetings be conducted properly. With distinguished guests in attendance, this requirement is especially important. The meetings should be conducted in an atmosphere of friendly hospitality, while at the same time the proper procedure for introduction of distinguished guests and the principal speaker should be closely followed. Books on parliamentary procedure, etiquette and social usage, and the duties of toastmasters can be found in any post library.

One of the best methods of achieving success is to emulate a successful operation. This applies equally to chapter activity. Listed below are the five top chapters in the Fiscal Year competition just completed.

Fort Benning 882 Points Outstanding Chapter Award

Atlanta	782
Mohawk	768
Hawaii	602
Wright Brothers	459

A letter to any or all of the above, requesting a copy of chapter program for the year will pay big dividends in getting your program off to a flying start for Fiscal '60.

For further information on individual or corporate membership in the Association, circle No. 200 on reply card.

AFM Salutes AFMA on its 7th year of Progress—since Aug. 13, 1952

Fort Benning Wins AFMA Chapter Award

Fort Benning, after a one year hiatus, continued its winning way by annexing the Outstanding Chapter Award for the Association year ending May 31. This award, the Association's top recognition for group effort, is given annually to the chapter achieving the highest multiple score under rules laid down by AFMA for the annual competition.

Winner in 1956 and '57, it was fitting that the Benning group should be the first to receive the handsome new plaque developed this year for the event. Accepting the award for his chapter, which is entitled to custody of the plaque for the coming year, was its president, Colonel Robert S. Cain, DNRI at the Army Infantry School. When informed that many chapters already had their sights on the award for the coming year's competition Colonel Cain replied, "That's fine, but we've decided to keep it right down at Benning!"

Included in the multiple used to determine final standing of chapters

How To Get Things Done Better And Faster



BOARDMASTER VISUAL CONTROL

- ☆ Gives Graphic Picture—Saves Time, Saves Money, Prevents Errors
- ☆ Simple to operate—Type or Write on Cards, Snap in Grooves
- ☆ Ideal for Production, Traffic, Inventory, Scheduling, Sales, Etc.
- ☆ Made of Metal Compact and Attractive. Over 350,000 in Use

Full price \$49.50 with cards

FREE

24-PAGE BOOKLET NO. AM-20
Without Obligation

Write For Your Copy Today

GRAPHIC SYSTEMS

55 West 42nd Street • New York 36, N. Y.

For more facts request No. 115 on reply card.



AFMA's Outstanding Chapter Award went to Ft. Benning, Ga. Chapter of AFMA, was accepted by Chapter President, Col. Robert Cain.

are such factors as membership and growth; public relations and publicity; meetings and attendance; professional advancement projects; and General Evaluation (based on compliance with Chapter Manual, correctness of administrative procedures, etc.).

AFMA Chapter Presidents Listed

At the request of many members, current AFMA chapters and presidents are listed here (corrections should be reported promptly to National Headquarters)

National Capital Chapter, Washington, D. C.

Mr. Tom Kouzes
Route 3, Box 508
Mantua Sub-Division
Fairfax, Virginia

Naval Gun Factory Division of National Capital Chapter, Washington, D. C.

Captain C. J. Prah
Naval Gun Factory
Washington, D. C.

New York Chapter, New York #3

Mr. Milton Reitzfeld
Third Naval District
Room 1513
90 Church Street
New York 7, New York

Wright Brothers Chapter, Ohio #8

Dr. William E. Dickison
Professor of Economics
Graduate School of Business
USAFIT, Wright Patterson AFB
Dayton, Ohio

San Francisco Bay Chapter, California, #10

(To be announced)

Aberdeen Proving Ground Chapter, Md. #12

Mr. V. A. Spencer
R D 2
Havre De Grace, Maryland

Fort Benning Chapter, Georgia #13

Colonel Earl Richhard
Martin Army Hospital
Fort Benning, Georgia

Detroit Chapter, Michigan #15

Mr. Charles V. Veryser
1325 Wayburn
Grosse Pointe Park 30, Michigan

Central New Jersey Chapter #16

Mr. James S. Van Nuys
57 Minerva Avenue
Manasquan, New Jersey

Hawaii Chapter #18

Mr. Frank Jenkins
101 Kuuala Street
Kailua, Hawaii

Pueblo Chapter, Colorado #23

Mr. George C. Klein
3602 Morris
Pueblo, Colorado

Atlanta Chapter, Georgia #24

Colonel W. C. Howell
Headquarters, Third U.S. Army
Fort McPherson, Georgia

Great Salt Lake Chapter, Utah #25

Mr. Ray L. Davis
132 Colonial Avenue
Layton, Utah

Mohawk Chapter, Rome, New York #26

Mrs. Alice Lee MacHarg
P. O. Box 1313, Chapter #26 AFMA
Griffiss AFB, New York

Far East Chapter #27

Lt. Colonel Ford P. Tracey
Hq Sq 2712th Consolidated Acft Maint
Gp.
Box 366, APO 323, San Francisco, Calif.

Atlanta General Depot Chapter #28, Ga.

Mr. George M. Hoak
2689 Rockcliff Road S. E.
Atlanta 16, Georgia

Sacramento Valley Chapter #29, California

Mr. Thomas Mitchell, President
Sacramento Valley Chapter AFMA
Sacramento Air Materiel Area ATTN:
Cld
McClellan, California

Moody Air Force Base Chapter, Georgia #31

Mr. Thomas L. Tuggle
Box 420
Valdosta, Georgia

Great Lakes-Chicago Chapter, Ill. #32

Mr. Robert V. Smith
Headquarters
Ninth Naval District
Great Lakes, Illinois

Gosport Chapter, Portsmouth, Va. #33

Rear Admiral W. H. Leahy, USN
Commander,
Norfolk Naval Shipyard
Portsmouth, Virginia

San Antonio, Texas Chapter #17

Mr. Gordon Moore
414 South Vandiver Street
San Antonio 9, Texas

ARMED FORCES MANAGEMENT

A bro
investors

How s
a time w
of Amer
the gent

"We a
happens
there is
50 cents

Anybe
Such
bonds, c
New Yo
loan to
ration's
compan

Keep
human
about r
when a
and dov

In a
demand
tinue to
who bu

In o
Despite
long-ter
guaran

An a
questio

The
It shou
worries
friend
serve—

Then
tives. A
forces
through
return

No r
best a
obligat
of the
judgm
compa

By t
of all
scheme

Plain
should
stock
If not,
ments

AUGU

Your Investment Future

ARE YOU READY TO INVEST?

A broker we know recently remarked that some people make better investors than others because of the differences in their emotional makeup.

How's that again? On the surface, the remark sounded odd, coming at a time when interest in the stock market is at a peak and literally millions of Americans—presumably with varying personalities—are investors. But the gentleman has a point.

"We all know the type of person who starts to price yachts if his stock happens to advance 50 cents a share," he said. "And at the other extreme—there is the man who is ready to apply for relief if his stock goes down 50 cents a share."

Anybody here who can't name a few examples?

Such a person might be very happy investing in government savings bonds, or in other government or corporate bonds which are listed on the New York Stock Exchange. Corporate bonds, for example, constitute a loan to industry, and are ordinarily secured by mortgages on the corporation's factories or real estate. The value of the bonds of a prosperous company usually does not fluctuate as much as that of stocks.

Keeping an eye on how your stocks are doing from day to day is both human and intelligent, of course, but there is no reason to become alarmed about normal market fluctuations. As one celebrated financier growled when asked the trend of the market: "I predict that prices will go up and down."

In a free enterprise system, stock prices are determined by supply and demand—just like prices of everything else we buy. As such, they'll continue to rise and fall according to the opinions of numberless investors who buy and sell securities.

In other words, stock investments involve risks as well as rewards. Despite the past records of the companies in which you invest and the long-term market trend, common stocks don't ever offer any money-back guarantees.

An awareness of this blunt truth is the first step in probing a vital question. Are you ready to invest?

The second step involves a careful diagnosis of your financial situation. It should be obvious that it's difficult for someone plagued with money worries to remain calm if stock prices dip. "Every investor," our broker friend told us, "needs a cushion—savings, government bonds, a cash reserve—to guard against unexpected emergencies."

Then give some serious thought to your particular investment objectives. Are you looking for additional income to supplement your armed forces salary? A retirement fund for the future? Helping the children through college? Investing surplus dollars at what might be a better return than the banks pay?

No matter what sort of a program you need, it's important to get the best available advice. And the best advice can be had without cost or obligation from any reputable broker—such as those with Member Firms of the New York Stock Exchange. They will give you the benefit of their judgment and experience, along with pertinent information concerning a company or industry in which you have an interest.

By taking this sound approach, you will automatically avoid the greatest of all pitfalls to successful investing: tips and rumors, get-rich-quick schemes, and phony stock brokers.

Plainly, these are some of the mental and financial aptitude tests you should pass before deciding to become an investor. If you score well, the stock market may offer the investment opportunities you're looking for. If not, it's a pretty safe conclusion that you should stick to safer investments like bonds.

AUGUST 1959

Common Stock Investment Plan

For as little as \$10 a month you can purchase shares in HAMILTON FUNDS. Hamilton is an investment fund holding common stocks of over 80 corporations, selected for income and growth possibilities.

Hamilton Funds

HAMILTON MANAGEMENT CORP.
Dept. H-4 Box 5061, Denver 17, Colo.

Please send prospectus-booklet without obligation.

Name _____

Address _____

City _____ State _____

For more facts request No. 116 on reply card.



Keystone Growth Fund

Series K-2

A diversified investment in securities selected for possible long-term growth of capital and future income.

The Keystone Company
50 Congress Street, Boston 9, Mass.

Please send me prospectus describing your Growth Fund, Series K-2.

Name _____

Address _____

City _____ State _____

P-43

For more facts request No. 117 on reply card.

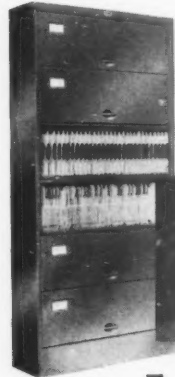
SPACEFINDER FILES...

... HAVE PROVEN, in hundreds of government offices, that they can SAVE YOU 50% or more filing time, space and money!

Spacefinder's exclusive advantages ...

1 Welded cabinet is designed specifically for MAXIMUM FILING EFFICIENCY. It is not an adaptation of shelving!

2 Spacefinders are complete, ready to use. When you move or change your department, you can MOVE THIS RUGGED FILE WITH CONTENTS INTACT!



3 Optional doors give DUST, DIRT and FIRE PROTECTION, serve as pull-out work shelves, and can be provided with locks.

NOTE visibility, availability of thousands of records.



IN USE BY GOVERNMENT THROUGHOUT THE NATION

Send today to Dept. AFM, Tab Products Co., 995 Market St., San Francisco 3, for 24-page brochure on Spacefinder Files.

TAB PRODUCTS CO.
For more facts request No. 118 on reply card.

PRODUC-TROL Visual Control

not only schedules,
But automatically checks
with TIME, LINE
and COLOR control



- Original cost and upkeep low.
- Schedules and time checks operations.
- Historical record to back it up.
- Bad situations show automatically.
- Its simplicity has put it into world-wide use.
- Analyze 100 items in 10 seconds.

Effective Tools for
Effective Management

WASSELL ORGANIZATION, INC.
Westport, Conn.

For more facts request No. 119 on reply card.

48

(Continued from Page 6)

quently evaluates concepts involving equipment in the developmental stage which will not reach the Boards for several years. To do this CDEC must use simulators.

Statement—Chances look good that one of Army's better new ideas is going to be killed for lack of proper use.

Fact—The contract for CDEC scientific support has just been renewed. The program through FY 1961 has been made firm by recently expanded capabilities. The fiscal 1962 program is now being developed. CDEC is rapidly completing its Empire Communications System and initiating its plans for the next phase of the Automatic Umpiring System.

I hope that you will find these comments helpful in informing your readers concerning the future of the Center.

Maj. Gen. H. P. Storke

Chief of Information
U.S. Army

There would appear to be some difference of opinion within the Army. Our sources for the above news item were field grade officers working with such organizations as Army Weapons Boards and schools. We ran the item because we felt that the men working day-to-day on this subject would tend to know what it was all about. But as we learned in our draftee days, it's the opinions at the top that count.—Ed.

Incorrect Demotion

Your attention is invited to an article entitled "Extensive Savings Seen for Minuteman by Air Force" on page 41 of your June 1959 issue.

You refer to Col. John Zoeckler as a Lieutenant Colonel. Col. Zoeckler has been a full Colonel for approximately eight years. I had the pleasure to be associated with him for approximately four years and I found him to be one of the outstanding procurement men in the Air Force.

Maj. Richard J. Chrysler

Base Procurement Office
Westover AFB, Mass.

Our apologies for the slip . . . on page 37 of the same issue in the item beginning "A pat on the back for the Army" we had it right, but batting .500 isn't enough in this league.—Ed.

Thanks extended

The article (Engineering Services: Buy or Build?, June ARMED FORCES MANAGEMENT) is excellent and should do much for our industry. Many thanks for the fine cooperation extended.

Frederick R. Einsidler

Vice Pres./General Mgr.
Consultants & Designers, Inc.

Dates to Circle

August

Annual Firings for Overseas CORPORAL Battalions—White Sands Missile Range, Ft. Bliss, Tex.

August 3-5

Association of the U.S. Army Convention—Washington, D.C.

August 6-9

National Counter-Intelligence Association Convention—Chicago, Ill.

August 8-16

International Aviation & Air Industries Fair—New York City

August 10-15

Beach Discharge Lighter Tests—Lower Chesapeake Bay Area

August 14-18

Marine Corps League Convention—Atlantic City, N.J.

August 19

National Aviation Day

Advertiser's Index

Air Transport Association	2
Automatic Electric Co., Sub. General Telephone & Electronics	9
Belco Div., Miller Mfg. Co.	32
Continental Aviation & Engrg. Co.	6
Electro Tec Corp.	4
General Logistics, Div. Aeroquip Corp.	30
Graphic Systems, Inc.	46
Hamilton Management Corp., The	47
Frank G. Hough Co., The	1
Keystone Co., The	47
LeTourneau-Westinghouse Co.	Cover 3
Management Control Charts Co.	31
Northrop Corp.	Cover 4
Radio Corporation of America	19
Tab Products Co.	48
Teletype Corp.	Cover 2
Wassell Organization, Inc.	32, 38, 44, 48
Westinghouse Electric Corp.	24 & 25

AN FITTINGS & HARDWARE

Stainless, Aluminum, Brass, Steel
All sizes—immediate delivery from world's largest shelf stock. Buy direct from manufacturer. Lower prices—quicker service. Send for free wall chart showing complete line of AN and MS fittings and hardware. We also machine parts to your own special print.

COLLINS ENGINEERING CORPORATION
9050 Washington Blvd., Culver City, California

ARMED FORCES MANAGEMENT

Cape Const
are "fine fo
ple to open

Constru
second
project
was giv
tors of
up of T
tion of
Frouge
Bridge
military
tion. Th
with fiv
inghou
D Tou
Adams

On cyc
138-hp
loads o
spread
tion bu
160-hp
ting an
roads
gravel

Admin
the de
'Pulls
in kee
"There
repairs
were l

LW r
milita
opera
wide



Cape Constructors' D 'Pull operator, Steve Yaremp, says units are "fine for work on housing jobs. Electric controls are simple to operate and the machines are a cinch to maneuver."



Construction of an urgently needed second 500-home military housing project at Dover Air Force Base, Del., was given a fast start by Hart Constructors of Dover. A joint venture made up of Terminal Construction Corporation of Wood-Ridge, New Jersey and Frouge Construction Co., Inc. of Bridgeport, Conn.—largest builders of military Capehart housing in the nation. The firm handled site preparation with five high-speed LeTourneau-Westinghouse earthmovers—four 29.5-mph D Tournapulls® and a 26-mph LW Adams* 660 motor grader.

On cycles about a mile long, the four 138-hp 'Pulls* averaged a total of 50 loads of gravel per hour. Material was spread as base for temporary construction buildings and parking lots. The 160-hp grader ranged the spread, cutting and maintaining haul and access roads and smoothing scraper-spread gravel on the fill in its spare time.

"Practically no lost time"

Administrator Jack Chasin reports that the dependability of the "660" and D 'Pulls was outstanding, and a real help in keeping the operation on schedule. "There was practically no lost time for repairs," he says, "and operating costs were low."

LW machines are well adapted for military needs. They are easy to operate, simple to maintain. World-wide service is available.

LW earthmovers speed start of air base housing project



"It's easy to keep ahead of scrapers on the fill with this grader," reports John Ratledge, operator of Cape Constructors' Adams 660. "It's got plenty of power, easy handling controls, and I have a good view of the blade all the time."

*Trademark GDP-2035-ML-1



LETOURNEAU-WESTINGHOUSE COMPANY
A Subsidiary of Westinghouse Air Brake Company

FACTORIES in Peoria, Illinois; Toccoa, Georgia; Indianapolis, Indiana; Sydney, Australia; and Campinas, Brazil

Where quality is a habit

Government Sales Dept.

Peoria, Illinois Ph. 3-4521
916 Ring Bldg., 1200 18th St. N.W.
Washington 6, D.C. Ph. Republic 7-7445
994 Pacific Electric Bldg., 610 S. Main St.
Los Angeles 14, Cal. Ph. Michigan 9-717

ARMY LIBRARY
ROOM 1A522
THE PENTAGON COPY #2
WASHINGTON 25 D C
C-AFM 4-74-9 11-8

NEWS IS HAPPENING AT NORTHROP \



Radioplane drones shown left to right: XQ-4B; RP-76; RP-77D; OQ-19; SD-1

RADIOPLANE CREATES FIRST FAMILY OF UNMANNED AIRCRAFT TO TRAIN MEN, EVALUATE WEAPON SYSTEMS, AND SURVEY ENEMY TERRITORY

Radioplane is the world's leading producer of drones \ and space age recovery systems. As live targets, drones perform as aircraft—then can be recovered by parachute. As evaluators, drones simulate the appearance of the enemy threat while they score our weapon systems' effectiveness. On surveillance missions, drones are zero-length launched, fly cameras, take photos, and return with information within minutes. For 20 years Radioplane has led in the production of drones. Radioplane's leadership in the field typifies

the years-ahead thinking that continues to produce design concepts for tomorrow, hardware for today—developed, produced, and delivered on time—at minimum cost to the taxpayer.



RADIOPLANE

Van Nuys, California, and El Paso, Texas
A Division of NORTHROP CORPORATION

For more facts request No. 120 on reply card.